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# Evaluation and outcome Of Laparoscopic Surgery in Pregnant patients with Acute Abdomen

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## Abstract

*Background: Surgical complications such as Appendicitis, acute cholecystitis, and small bowel obstruction are among the many pathologies that can cause abdominal pain during pregnancy.*

*Aim and objective: To evaluate the safety, priority, and complications of laparoscopic surgery in pregnant females.*

*Patients and methods: This prospective clinical trial includes 53 patients selected from attendees of General Surgery clinics of Al-Azhar University Hospitals. Samples were collected using a random systematic method.*

*Results: There was no conversion to laparotomy in all cases and no complications in 47, but there was prolonged paralytic ileus in 2 and wound infection in 4 patients. Operation time ranged from 30 to 48, and the fetal heart rate was normal in each case, postoperative analgesia duration ranged from 1 to 2 days. The hospital stay ranged from 2 to 6 days. Pregnancy outcomes showed that only one case had an abortion, while pregnancy was preterm in 3 patients and term in 49 patients. As regards delivery, 22 patients had cesarean section, while 31 had vaginal delivery, no neonate was admitted to the NICU, and APGAR 1 min was 8 in 6 neonates, 9 in 28 and 10 in 19 and APGAR 5 min was 9 in 6 and 10 in 47.*

*Conclusion: Laparoscopic procedures are safe and effective for managing acute surgical emergencies in pregnant women, with low complication rates, no conversions, and minimal adverse effects on fetal wellbeing. Experienced surgeons can ensure excellent neonatal outcomes.*

**Keywords:** Laparoscopic surgery; Pregnancy; acute abdomen; Outcome

## 1. Introduction

Surgical complications such as Appendicitis, acute cholecystitis, and small bowel obstruction are among the many pathologies that can cause abdominal pain during pregnancy. Obstetric complications, including placental abruptions, ectopic pregnancies, and miscarriages, as well as typical physiological transformations like round ligament stretching.<sup>1</sup>

While Early detection and intervention typically result in enhanced outcomes for both the mother and the fetus, reaching an accurate diagnosis can be difficult to achieve as a result of the confounding physiological changes that occur during pregnancy. Surgical intervention performed during pregnancy aims to reduce fetal harm while simultaneously alleviating maternal illness. Maternal and fetal morbidity

and mortality are increased by acute surgical disease by itself. In contrast to the surgical procedure itself, the severity of the underlying surgical disease might have the greatest impact on maternal and fetal outcomes.<sup>2</sup>

The common complications of pregnancy that do not involve obstetrics include acute Appendicitis, intestinal obstruction, and cholecystitis. Appendicitis is the most frequent etiology of acute abdomen during pregnancy. The incidence varies between 1:2000 & 1:6000.<sup>3</sup>

The proliferation of laparoscopic surgical techniques has garnered a wealth of practical surgical experience in a variety of clinical settings over the last two decades on a global scale. Surgeons are now capable of performing developed surgical techniques on cases, even in isolated rural regions, due to their education and experience.<sup>4</sup>

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A surgeon's proficiency in technical matters can be effectively utilized in more difficult situations, such as when a pregnant patient presents with an urgent surgical condition. The surgeon must be ready to make treatment decisions regarding the patient's condition and circumstances, their own capabilities, and the support systems at their disposal, as this type of patient may present at any moment and in any location.<sup>4</sup>

This study aimed to evaluate the safety, priority, and complications of laparoscopic surgery in pregnant females.

## 2. Patients and methods

This prospective clinical trial includes 53 patients selected from attendees of the General Surgery clinics of Al-Azhar University Hospitals. Samples were collected using a random systematic method.

### Ethical consideration

The Local Ethics Committee has granted approval for the study protocol, and written informed consent has been obtained.

**Inclusion criteria:** Pregnant cases diagnosed with acute abdominal pain, ability to provide informed consent, and Patients without any severe medical comorbidities.

**Exclusion criteria:** Patients with an underlying condition that would contraindicate surgery (e.g., severe heart or lung disease), Patients with a bleeding disorder or on blood thinning medications, Patients who are unable or unwilling to comply with postoperative follow-up requirements, and Pregnant females with threatened abortion.

### Sample Size

Epi Info STATCLAC was utilized to compute the results of this research under the following assumptions: a two-sided confidence level of 95% and a confidence level with an 80% power of research. From the EPI-Info output, a minimum sample size of 45 cases was derived. Assuming that some cases would be dropped during follow-up, the sample size was expanded to 53.

### Methods

All patients were subjected to the following:

**Complete history taking:** Personal history, any complaints, Past medical and past surgical history, family history, and Complete physical examination: General examination: Vital signs and Signs of ( Jaundice, Pallor, Cyanosis, Lymph node enlargement), Pre-operative Laboratory investigations: CBC, LFT, KFT, Coagulation profile, abdominal ultrasound, Pre-procedure measurement: Demographics: age, sex, weight, height, etc., medical history: underlying conditions, previous treatments, and medications and radiological evaluation: pelviabdominal ultrasound.

**Follow-up measurements:** Symptoms of abdominal pain, including upper or lower abdominal pain that may be severe, burn, nausea, vomiting, abdominal distention, change bowel habits (constipation, diarrhea), and diagnostic follow-up by CBC, pelviabdominal ultrasound

**Data analysis:** The gathered information was encoded, processed, and assessed utilizing the SPSS (Version 25) program for Windows. The calculations for descriptive statistics will comprise the following: standard deviations, medians, means, ranges, and percentages. The averages of normally distributed data will be compared using independent t-tests for continuous variables, whereas the median variations of non-normally distributed information will be assessed using Mann-Whitney U tests, and categorical information will be evaluated using the chi-square test.

**Administrative considerations:** An Official authorization was received from in University Hospitals, an official authorization was received from the Institutional study and approval from ethical committee in the faculty of medicine (Institutional Research Board IRB).

## 3. Results

The average age of the cases was 25.49 weeks, with a range of 20 to 34 weeks for the duration of pregnancy, their averages BMI of the cases varied between 17 and 32, with 26 multiparous and 27 nulliparous. (Table 1)

Table 1. Demographic data of the pregnant women who had laparoscopy for acute abdomen

PARAMETER	N	%
AGE (YEAR)		
MIN.-MAX.		18-42
MEAN ±SD.		25.49±5.44
GESTATIONAL WEIGHT (WEEK)		
MIN.-MAX.		20-34
MEAN ±SD.		26.66±4.75
BMI (KG/M2)		
MIN.-MAX.		17-32
MEAN ±SD.		22.66±3.66
PARITY		
MULTIPAROUS	26	49.1
NULLIPAROUS	27	50.9

All patients had abdominal pain, and the abdominal pain was Peri-umbilical pain in 3 patients, right iliac fossa pain in 4 and in the right hypochondriac area in 17 and in the right lumbar area in 29 patients, the abdominal pain duration ranged from two to five days. There was fever in 43 patients, fever duration ranged from two to four days. All patients suffered from nausea, while vomiting was presented in 42 patients. All patients had leukocytosis where the WBCs count was high, ranged from 13 to 36\* 103 cell/mm<sup>3</sup>. As regards surgery history 17, patients had Caesarean Section, while 3 had previous abdominal surgery. (Table 2)

*Table 2. Preceding symptoms and clinical features of the pregnant women who had laparoscopy for acute abdomen*

PARAMETER	N	%
ABDOMINAL PAIN		
YES	53	100
NO	0	0
ABDOMINAL PAIN SITE		
PERI-UMBILICAL PAIN	3	5.7
RIGHT HYPOCHONDRIAC AREA	17	32.1
RIGHT ILIAC FOSSA PAIN	4	7.5
RIGHT LUMBAR AREA	29	54.7
ABDOMINAL PAIN DURATION (DAY)		
MIN.-MAX.	2-5	
MEAN ±SD.	3.47±1.012	
FEVER		
YES	43	81.1
NO	10	18.9
FEVER DURATION (DAY)		
MIN.-MAX.	2-4	
MEAN ±SD.	2.44±0.590	
NAUSEA		
YES	53	100
NO	0	0
VOMITING		
YES	42	79.2
NO	11	20.8
WBCS *10 <sup>3</sup>		
MIN.-MAX.	13-36	
MEAN ±SD.	23.43±6.21	
LEUKOCYTOSIS		
YES	53	100
NO	0	0
SURGERY HISTORY		
CAESAREAN SECTION	17	32.1
PREVIOUS ABDOMINAL SURGERY	3	5.7

Surgical indications of the pregnant women who had laparoscopy for acute abdomen were as follow; appendicitis in 21, cholecystitis in 13, ovarian mass in 5, ovarian simple cyst in 5 torsion in 5, and adhesive small bowel obstruction in 4 patients.

*Table 3. Surgical indications of the pregnant women who had laparoscopy for acute abdomen*

Surgical indications	N	%
Appendicitis	21	39.6
Cholecystitis	13	24.5
Ovarian mass	5	9.4
Ovarian simple cyst	5	9.4
Torsion	5	9.4
Adhesive small bowel obstruction	4	7.5
Total	53	100.0

Laparoscopic approaches of the pregnant women who had laparoscopy for acute abdomen were according to their prevalence as follows; laparoscopic appendectomy in 21, laparoscopic cholecystectomy in 13, laparoscopic adnexal surgery in 5, laparoscopic cystectomy in 5, laparoscopic detorsion in 5, and laparoscopic Adhesiolysis in 4 patients. (Table 4)

*Table 4. Laparoscopic approaches of the pregnant women who had laparoscopy for acute abdomen*

Operation	N	%
Laparoscopic Appendectomy	21	39.6
Laparoscopic Cholecystectomy	13	24.5
Laparoscopic Adnexal Surgery	5	9.4
Laparoscopic Cystectomy	5	9.4
Laparoscopic Detorsion	5	9.4
Laparoscopic Adhesiolysis	4	7.5
Total	53	100.0

Outcomes of laparoscopic approaches

performed on pregnant women undergoing laparoscopy for acute abdomen demonstrated that in all cases, there was no conversion to laparotomy, & no complications in 47, but there was prolonged paralytic ileus in 2 and wound infection in 4 patients. Operation time ranged from 30 to 48 minutes while fetal heart rate remained normal in all cases, post-operative analgesia duration ranged from 1 to 2 days. The hospital stay ranged from 2 to 6 days. (Table 5)

*Table 5. Outcomes of laparoscopic approaches of the pregnant women who had laparoscopy for acute abdomen*

PARAMETER	N	%
CONVERSION TO LAPARATOMY		
YES	0	0.00
NO	53	100
COMPLICATIONS		
NONE	47	88.7
PROLONGED PARALYTIC ILEUS	2	3.8
WOUND INFECTION	4	7.5
OPERATION TIME (MIN.)		
MIN.-MAX.	30-48	
MEAN ±SD.	40.02±5.507	
FOETAL HEART RATE		
NORMAL	53	100
ABNORMAL	0	0.00
POST-OPERATIVE ANALGESIA DURATION (DAY)		
1	26	49.1
2	27	50.9
POST-OPERATIVE ANALGESIA DURATION (DAY)		
MIN.-MAX.	1-2	
MEAN ±SD.	1.51±0.505	
THE HOSPITAL STAY (DAY)		
2	18	34.0
3	19	35.8
4	8	15.1
5	3	5.7
6	5	9.4
THE HOSPITAL STAY (DAY)		
MIN.-MAX.	2-6	
MEAN ±SD.	3.21±1.25	

Pregnancy outcome showed that only one case had abortion, while pregnancy was preterm in 3 patients, and term in 49 patients. As regards delivery, 22 patients had caesarean section, while 31 had vaginal delivery, no neonate was admitted to the NICU, and APGAR 1 min was 8 in 6 neonates, 9 in 28 and 10 in 19 and APGAR 5 min was 9 in 6 and 10 in 47. (Table 6)

*Table 6. Outcomes of pregnancy of the pregnant women who had laparoscopy for acute abdomen*

PARAMETER	N	%
PREGNANCY OUTCOME		
ABORTION	1	1.9
PRETERM	3	5.7
TERM	49	92.5
TYPE OF BIRTH		
CAESAREAN SECTION	22	41.5
VAGINAL	31	58.5
NICU		
YES	0	0.00
NO	53	100
APGAR 1 MIN		
8	6	11.3
9	28	52.8
10	19	35.8
APGAR 1 MIN		
MIN.-MAX.	8-10	
MEAN ±SD.	9.25±0.648	
APGAR 5 MIN		
9	6	11.3
10	47	88.7
APGAR 5 MIN		

MIN.-MAX.	9-10
MEAN $\pm$ SD.	9.89 $\pm$ 0.320

#### 4. Discussion

Acute cholecystitis ranks as the second most prevalent etiology of acute abdomen in pregnant women, with an incidence of 1 in 1600–10000 pregnancies. The etiology of cholecystitis in 90% of cases is Cholelithiasis. Cholelithiasis occurs between 3.5% and 10% of the time in pregnant women conducting routine obstetric ultrasound assessments.<sup>5</sup>

The main results of our study were as follows:

The pregnancy period varied between 20 and 34 weeks (mean 26.66 $\pm$ 4.75 weeks). Their BMI mean ranged from 17 to 32, and the mean was 22.66 $\pm$ 3.66 kg/m<sup>2</sup>. Multiparous patients were 26(49.1%), and Nulliparous were 27(50.9%).

Kara and Somuncu reported when diagnosed, the gestational ages of patients who underwent non-obstetrical surgery were as follows: first trimester in two (22%), second trimester in four (44%), and third trimester in three cases (34%).<sup>6</sup>

In our study, all patients had abdominal pain, and the abdominal pain was Peri umbilical pain in 3(5.7%) patients, right iliac fossa pain in 4(7.5%), and in the right hypochondriac area in 17(32.1%), and in the right lumbar area in 29(54.7%) patients, the abdominal pain duration ranged from two to five days and mean was 3.47 $\pm$ 1.012 days.

Kara and Somuncu reported that the prevailing manifestation was abdominal pain, with tenderness in the lower right quadrant being the most frequent finding.<sup>6</sup>

Mahjoubi et al. reported that the right hypochondrium was identified as the site of abdominal pain in 75% of pregnant cases who presented with acute cholecystitis.<sup>5</sup>

In our study, there was fever in 43(81.1%) patients; fever duration ranged from two to four days, and the mean was 2.44 $\pm$ 0.590 days. All patients suffered from nausea, while vomiting was presented in 42(79.2%) patients. All patients had leukocytosis where the WBC count was high, ranging from 13 to 36\* 10<sup>3</sup> cells/mm<sup>3</sup>, and the mean was 23.43 $\pm$ 6.21.

Mahjoubi et al. reported that fever was noted in 21% of cases.<sup>5</sup>

Loss of appetite and vomiting are common symptoms observed during uneventful pregnancies, frequently accompanied by leukocytosis.<sup>7</sup>

In our study, Appendicitis was one of the surgical indications for laparoscopy performed on pregnant women with acute abdomen in 21(39.6%), cholecystitis in 13(24.5%), ovarian mass in 5(9.4%), ovarian simple cyst in 5(9.4%), torsion in 5(9.4%), and adhesive small bowel obstruction in 4(7.5%) patients.

Rege et al. reported that Acute Appendicitis was identified in 55.55% (n = 10) of 18 cases, while gallbladder pathology was diagnosed in 44.45% (n = 8). There was perforation in Fifty percent (n = 5) of the ten cases diagnosed with Appendicitis and 37.5% (n = 3) of the eight cases with gallbladder pathology.<sup>1</sup>

Sunitha et al. Acute Appendicitis and cholecystitis were observed in 33.33% (n = 6), respectively, among 18 cases with non-obstetric acute abdomen.<sup>8</sup>

In our research, laparoscopic approaches of the pregnant women who had laparoscopy for acute abdomen were according to their prevalence as follows; laparoscopic appendectomy in 21(39.6%), laparoscopic cholecystectomy in 13(24.5%), laparoscopic adnexal surgery in 5(9.4%), laparoscopic cystectomy in 5(9.4%), laparoscopic detorsion in 5(9.4%), and laparoscopic Adhesiolysis in 4(7.5%) patients.

Vujic et al. reported that cholecystectomy was performed in 4 cases (5%) without adverse effects on pregnancy.<sup>9</sup>

Mahjoubi et al. reported that Thirty-two patients (68%) underwent laparoscopic cholecystectomy.<sup>5</sup>

In our study, outcomes of laparoscopic approaches of Pregnant women who underwent laparoscopy for acute abdominal symptoms did not progress to laparotomy in all cases, and no complications in 47(88.7%), but there was prolonged paralytic ileus in 2(3.8%), and wound infection in 4(7.5%) patients. Operation time ranged from 30 to 48 minutes, and the mean was 40.02 $\pm$ 5.50; postoperative analgesia duration was one day in 26(49.1%) and two days in 27(50.9%), where it ranged from 1 to 2 days with a mean of 1.51 $\pm$ 0.505. The hospital stay ranged from 2 to 6 days, and the mean was 3.21 $\pm$ 1.25 days.

Rege et al. reported that no complications were observed in any of the cases post-operatively. The average period of hospitalization for cases undergoing laparoscopic cholecystectomy was 3.66 days, whereas laparoscopic appendectomy required three days. No conversions to open surgery occurred in any of the cases.<sup>1</sup>

Kocael et al. reported that Successful laparoscopic appendectomies required an average of 43.9 minutes to complete, with a 16.6% conversion rate to open surgery. They believe that an increase in the number of patients and the level of expertise would assist in further decreasing the duration of the operation and the rate of conversion to open surgery.<sup>7</sup>

In our study, pregnancy outcome showed that only one case had an abortion, while pregnancy was preterm in 3(5.7%) patients and term in 49(92.5%) patients. As regards delivery, 22(41.5%) patients had a cesarean section, while 31(58.5%) had a vaginal delivery, no neonate

was admitted to the NICU, and APGAR 1 min was 8 in 6(11.3%) neonates, 9 in 28(52.8%), and 10 in 19(35.8%), and mean of  $9.25 \pm 0.648$ , and APGAR 5 min was 9 in 6(11.3%), and 10 in 47(88.7%), with mean of  $9.89 \pm 0.320$ .

Rege et al. reported that, following 15 days of surgery, one of the eight patients experienced a spontaneous abortion, and the remaining patient underwent a vaginal delivery of normalcy. Preterm labor did not occur in any of the patients.<sup>1</sup>

Gök et al. observed in their research that there is no significant variance in fetal or maternal results after laparoscopic appendectomy open appendectomy.<sup>10</sup>

Sachs et al. determined that approximately 5% of pregnant women who underwent appendectomy or cholecystectomy during pregnancy encountered adverse obstetrical results after stratifying the risks associated with these procedures. It was discovered that pre-existing conditions such as sepsis and cervical incompetence had an impact on adverse pregnancy results, while the surgical approach itself had no effect.<sup>11</sup>

It is important to note, however, that the reduced incidence of maternal and fetal complications is a result of a shorter operative time, which is achieved through laparoscopic training, experience, and the development of skills necessary to perform complex and advanced laparoscopic procedures.

Moreover, Several studies have demonstrated that laparoscopy does not contribute to fetal loss.<sup>12</sup> An additional investigation examining the impact of laparoscopy on fetal acidosis and elevated intra-abdominal pressure revealed that the procedure, which lasted for a maximum of 60 minutes and utilized a pneumoperitoneum pressure of 10-12 mmHg, did not induce any observable adverse effects on the fetus.<sup>13</sup>

Limitations: The sample size of 53 patients is relatively small, and the findings may not be generalizable to all patient populations or practice settings. As a single-center study, there is a potential for selection bias and variation in surgical techniques or perioperative management that could influence outcomes. Additionally, the study did not include a comparison group of pregnant women undergoing open procedures or non-operative management, which would have allowed for a more direct assessment of the relative advantages and disadvantages of laparoscopy. Longer-term follow-up data on maternal and infant health outcomes beyond the immediate postpartum period are also lacking. Future multicenter prospective studies with larger cohorts and comparative groups would help to further validate and refine the role of

laparoscopy in the management of acute abdominal conditions during pregnancy.

#### 4. Conclusion

Laparoscopic procedures are safe and effective for managing acute surgical emergencies in pregnant women, with low complication rates, no conversions, and minimal adverse effects on fetal wellbeing. Experienced surgeons can ensure excellent neonatal outcomes.

#### Disclosure

The authors have no financial interest to declare in relation to the content of this article.

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