



(RESEARCH ARTICLE)



## Emergency laparoscopic surgery in pregnancy

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### Abstract

**Introduction:** The decision to proceed with surgical intervention is often difficult in pregnant women, particularly in emergency contexts. Opting for laparoscopic surgery in pregnant women is even more challenging. Concerns during laparoscopic procedures include potential fetal injury, reduced uterine blood flow due to pneumoperitoneum, and fetal acidosis. The objective of our study is to evaluate the feasibility and morbidity-mortality of emergency laparoscopy in pregnant women.

**Materials and Methods:** This is a descriptive and prospective study conducted between February 2018 and October 2021, involving 337 patients who underwent laparoscopic surgery for acute non-traumatic abdominal emergencies.

**Results:** Among the 190 female patients operated on, 18 patients (9.47%) were pregnant: 8 (44.5%) had acute appendicitis, 7 (38.9%) had acute lithiasic cholecystitis, 2 (11.2%) had ovarian cyst torsion, and 1 (5.6%) had an appendiceal abscess. This laparoscopic management was performed across different gestational ages. The mean gestational age of our patients was  $15 \pm 14$  weeks of amenorrhea (minimum 7 weeks, maximum 29 weeks). The mean operative time for the surgical interventions in these pregnant women was 61.2 minutes  $\pm$  20.16 minutes. No intraoperative complications or incidents, no conversions, and no abortions were recorded.

**Conclusion:** Laparoscopy can be safely used to manage acute non-traumatic abdominal emergencies during pregnancy.

**Keywords:** Acute abdomen; Pregnancy; Laparoscopy; Fetal injury

### 1. Introduction

Non-obstetric conditions requiring surgical intervention during pregnancy are not uncommon. They affect approximately 1 in 635 to 1 in 500 pregnant women [1-3]. The most common conditions, in descending order, include acute appendicitis, acute lithiasic cholecystitis, acute intestinal obstruction, complications of ovarian cysts, complications of asymptomatic hernias, and acute non-specific abdominal pain [1,4-6].

Establishing a definitive diagnosis in pregnant women is often challenging due to atypical clinical symptoms arising from hormonal, physiological, and anatomical changes, as well as contraindications for certain radiological examinations, notably CT scans. Consequently, deciding to perform surgical intervention in pregnant women, especially in emergency settings, is often difficult [7]. General anesthesia and the resultant muscle relaxation can potentially lead to miscarriage. During laparoscopic surgeries, in addition to the risks associated with anesthesia, other factors specific to this approach can increase the risk of complications. Concerns regarding laparoscopy during pregnancy include fetal injury, reduced uterine blood flow due to pneumoperitoneum, and fetal acidosis [8]. As a result, there is an increased risk of miscarriage or preterm delivery.

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The objective of our study is to evaluate the feasibility and morbidity-mortality of emergency laparoscopy in pregnant women.

## 2. Materials and Methods

This descriptive and prospective study was conducted between February 2018 and October 2021, involving 337 patients who underwent laparoscopic surgery for non-traumatic acute abdominal emergencies. We included in this study all adult patients aged 15 years and older presenting solely with non-traumatic acute surgical abdominal emergencies. We excluded from this study traumatic emergencies, patients classified as ASA IV, and patients in hypovolemic or septic shock.

A gynecological consultation was systematically performed preoperatively for our female patients. Based on the recommendations of our gynecologists, tocolysis was routinely initiated preoperatively and continued intra- and postoperatively. A pelvic ultrasound with fetal heart rate monitoring was systematically conducted before and after the surgery.

The first laparoscopic trocar was always placed at the umbilicus using an open laparoscopy technique, with extreme caution to avoid injuring the uterus. When the uterine volume was significant, we took the precaution of reducing the CO<sub>2</sub> insufflation pressure to 10 mm Hg instead of 12 mm Hg, to prevent hypercapnia and the adverse effects of CO<sub>2</sub> compression on the uterus and maternal-fetal blood circulation. In all cases, laparoscopy was employed following the patients' informed consent.

## 3. Results

Among the 337 patients who underwent surgery for non-traumatic acute abdomen, 52.6% had simple or complicated acute appendicitis, 25.9% had acute lithiasic cholecystitis, 7.12% had adnexal torsion, 6.9% had ectopic pregnancies, 3% had perforated peptic ulcers, 2.37% had intestinal obstructions due to adhesions, and 2.1% had non-specific acute abdominal pain.

Out of the 337 patients included and operated on in our study, 190 were women (56.4%), with an average age of  $38 \pm 15$  years (range 15 to 82 years). The body mass index (BMI) was over 25 in 179 patients (53.11%). Comorbidities were found in 109 patients (32.3%), and 90 patients (26.7%) had a history of abdominal surgery. The patients were classified as ASA I in 74.8% (252 patients), ASA II in 22% (74 patients), and ASA III in 3.3% (11 patients).

Among the 190 female patients who underwent surgery, 18 (9.47%) were pregnant. The different emergency pathologies operated on in these patients are summarized in Table 01. The average gestational age of our pregnant patients was  $15 \pm 14$  weeks of amenorrhea (minimum 7 weeks, maximum 29 weeks).

**Table 1** Pathologies operated during pregnancy

Pathologies operated on	N	%
Acute appendicitis	08	44,5
Lithiasic acute cholecystitis	07	38,9
Ovarian cyst torsion	02	11,2
Appendicular abscess	01	5,6
Total	18	100

The average operative time for the surgical interventions performed on these pregnant women was  $61.2 \pm 20.16$  minutes (range: 51-88 minutes). The total duration of anesthesia (duration of the surgical procedure) was  $78.35 \pm 14.18$  minutes (range: 65-118 minutes).

No intraoperative complications, incidents, conversions, or abortions were recorded. Among the 18 operated patients, there was one case of wound sepsis at the umbilical trocar site (5.6%). The average overall hospitalization duration was  $1.5 \pm 1$  days.

After a follow-up period of one year and post-delivery of the various patients, no fetal malformations were recorded. However, there was one case of incisional hernia (5.55%) at the umbilical trocar site.

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#### 4. Discussion

The decision to proceed with surgical intervention is often challenging in pregnant women, particularly in emergency contexts [7]. Non-obstetric conditions necessitating surgical intervention during pregnancy are not uncommon, occurring in approximately one out of 635 to one out of 500 pregnant women [1-3]. The most prevalent pathologies, in descending order, include acute appendicitis, acute lithiasic cholecystitis, acute intestinal obstructions, complications of ovarian cysts, complications of asymptomatic hernias, and non-specific acute abdominal pain [1,4-6]. Recent studies suggest that laparoscopy can be performed without complications throughout all three trimesters of pregnancy [5-7, 9,10].

In our series, laparoscopic management encompassed various gestational ages of pregnancy. The mean gestational age of our patients was  $15 \pm 14$  weeks of amenorrhea (minimum 7 weeks, maximum 29 weeks). No incidents were recorded. We observed that during appendectomies performed at the end of the second trimester or during the third trimester, we encountered an 'anatomical rearrangement' due to the ascent of the uterus above the umbilicus. The cecum and appendix were displaced towards the right flank or even into the subhepatic region. We did not encounter any specific difficulties in exposure or in performing the surgical procedure. The only precaution necessary was to place the two lateral trocars to facilitate exposure while respecting the arc of the circle (triangulation) formed by the trocars. For adnexal torsions during pregnancy, intraoperative exposure was not an issue as the uterus enlarges, and the adnexa ascend with it, easily exposing them.

Laparoscopy spared us from enlargement and parietal damage, unlike laparotomy, where in such situations, it would have required incision enlargement and muscular damage, or even changing or replacing the elective approach with a median approach for better exposure and surgical procedure execution. Postoperatively, no miscarriages or preterm deliveries were noted.

Nowadays, the laparoscopic approach in acute abdominal syndromes during pregnancy is widely used based on several recommendations [7,11]. Several case series confirm the feasibility and safety of this surgical procedure [12].

British guidelines consider laparoscopy as the appropriate approach during pregnancy, provided that the necessary surgical equipment and expertise are available. There are no additional risks of fetal malformations or miscarriages [13].

Concerns regarding laparoscopy during pregnancy include fetal injuries, decreased blood supply to the uterus caused by pneumoperitoneum, and fetal acidosis [8]. Consequently, there is an increased risk of miscarriage or preterm delivery. However, studies have shown that fewer adverse obstetric events occur during laparoscopic surgery compared to laparotomy. In our series, no miscarriages or malformations were recorded.

According to the American Society for Gastrointestinal Endoscopy (SAGES) recommendations in 2017 [14]:

- The laparoscopic management of acute surgical abdomen offers similar advantages to pregnant and non-pregnant patients compared to laparotomy (+++; strong level of recommendation).
- Laparoscopy can be safely used during all three trimesters of pregnancy when surgical intervention is indicated (+++; strong level of recommendation).
- In cases where radiological examinations are contraindicated during pregnancy, laparoscopy can be selectively integrated into the diagnostic workup of acute surgical abdomen during pregnancy (++; weak recommendation).

Concerning operative time, Apgar score, and birth weight. Conversely, there is less manipulation of the uterus and pelvic organs and better exposure during laparoscopic surgery [8].

Although in our study, systematic tocolysis was instituted, in the literature, there are no clear advantages to the use of tocolytic agents before, during, or after surgical intervention. Obviously, in the presence of imminent preterm labor, tocolysis is recommended. Insufflation with carbon dioxide at 12 mm Hg can be safely used [8].

## 5. Conclusion

Our results suggest that laparoscopy can be utilized regardless of gestational age, with certain advantages, including the absence of muscular damage and good intraoperative exposure, despite anatomical rearrangements and displacement of digestive structures by the uterine volume. Concerns regarding the risk of miscarriage and fetal malformation are not increased during laparoscopic surgery. Thus, laparoscopy can be safely used to manage non-traumatic abdominal emergencies during pregnancy.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

The data and files of patients presented in this manuscript are available at the Department of General Surgery of the University Hospital of Ain Taya.

### *Statement of informed consent*

All patients consent to their inclusion in this work and the publication of the results.

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All authors contributed to this work.

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### *Availability of Data and Materials*

The data (Patient records, information sheets for each patient) are available and entered in Excel and Word formats

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