Laparoscopic value in the management of acute abdomen during pregnancy

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Background
Acute abdominal pain during pregnancy represents a challenging pathology in diagnosis and treatment. This study aimed to evaluate the value of laparoscopy in managing pregnant patients presented with acute abdomen.
Materials and methods
From June 2022 to June 2023, 45 pregnant females presented with acute abdominal pain were prospectively analyzed. These patients were treated laparoscopically, aiming for diagnostic and treatment purposes. Intra- and Postoperative evaluations for the laparoscopic value were assessed for all possible complications early, during the hospital stay and until the first postoperative 30 days.
Results
Inflammation 82.2%, including acute appendicitis 89.7%, and cholecystitis 10.3%, were found to be the most common causes of acute abdomen. No intraoperative or postoperative morbidity, including infection, sepsis, or wound dehiscence, was reported until the first 30 days. Similarly, no postoperative mortality was detected. Moreover, no cases had abortions during their conception time.
Conclusion
Laparoscopic value exceeds the treatment advantages but has a significant role in diagnosing the etiologies of acute abdomen during pregnancy. Laparoscopy could successfully treat different pathologies during pregnancy. No restriction for the time of conception regarding the use of laparoscopy was reported. Further comparative studies regarding laparoscopic use during pregnancy should be conducted.

Keywords:
acute abdomen, laparoscopy, pregnancy

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Background

The term "acute abdomen" is often used to describe any intraperitoneal severe disease manifestations, which may indicate surgical intervention [1]. Acute abdomen in pregnancy accounts for ~7–10% of all abdominal emergencies [2].

Several pathologies could contribute to acute abdominal pain during pregnancy. They include obstetric and nonobstetric causes. As for the nonobstetric reasons, acute abdominal pain could present any gastrointestinal or urological disorders [3]. According to the 2020 update of the World Society of Emergency Surgery, acute appendicitis represents the most common cause of acute abdomen in pregnancy, with a lifetime risk of 9% in the USA, 8% in Europe, and 2% in Africa [2].

In pregnancy, several factors overlap and make the diagnosis challenging. These factors include the distorted anatomy of the growing uterus that displaces intraperitoneal structures. Additionally, nausea, vomiting, and abdominal pain are considered normal during pregnancy, especially in the first trimester. Moreover, a sure diagnosis must be achieved to operate on a pregnant woman with possible morbidity and mortality for the mother and fetus [1]. Therefore, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) proposed guidelines for using laparoscopy in patients with acute abdomen during pregnancy. These guidelines recommended suitable investigations for diagnosis and workup, patient selection, treatment, and perioperative care [4].

Laparoscopy can be safely performed during any trimester of pregnancy (Level II evidence). Historical recommendations were to limit surgery to the second trimester only, but these recommendations were based

on experience with open surgical procedures during pregnancy. These recommendations were thought to minimize the spontaneous abortion rate of surgical intervention during the first trimester, which was reported to be as high as 12% and to avoid preterm labor, reported in up to 40% when surgery occurred during the third trimester. However, studies limited to laparoscopy have shown improved outcomes and demonstrated that pregnant patients may undergo laparoscopic surgery safely during any trimester without any appreciated increase in risk to the mother or fetus [5].

This study aims to evaluate the role of laparoscopy in patients with acute abdomen during pregnancy.

Patients and methods

This is a multicenter prospective cohort study; it was conducted at Sohag and Aswan University hospitals from June 2022 to June 2023. The ethical committee approval for the study was obtained and registered with registration No. Soh-med-22-06-29.

Setting and participants

The study was conducted at Sohag and Aswan Universities, Sohag, Egypt. The study's purpose was to determine the value of laparoscopy in the management of acute abdomen during pregnancy in different post-treatment clinical outcomes for both the mother and fetus during the primary hospital stay (from the date of surgical intervention to the date of discharge) and classified according to the Clavien-Dindo classification system [5]. Overall complications during the first postoperative 30 days were also studied.

Eligibility criteria

All pregnant women with acute abdomen and who underwent surgical intervention were included in this study. Nonpregnant women with acute abdomen and pregnant women with associated comorbidities were excluded.

Data collection

Any pregnant woman presented with acute abdominal pain to the emergency department was subjected to the following preoperative preparation:

(1) Detailed history and accurate clinical examination.
(2) Laboratory investigations were routinely evaluated, including blood group, complete blood count, liver and renal function tests, blood sugar, and coagulation profile.
(3) Radiological investigations depend mainly on abdominal ultrasonography. Ionizing radiation, including radiography and computed tomography, was extremely limited unless necessary while using protective measures for the fetus by using a protective shield and cumulative radiation dosage limited to 50–100 milli-gray (mGy).
(4) Preoperative consultation of the obstetrician for assessing the fetal state and describing the required tocolytics. Patients were given safe antibiotics with prophylactic measures against deep venous thrombosis perioperatively.

Surgical procedure

After informed written consent, the patient was transferred to the operative theatre, and the following steps were adopted: the procedure was conducted under general anesthesia. According to the causative pathology, the positioning of the surgeon, assistant, patient's position, and laparoscopic monitor were modified. Port placement: initial abdominal access was accomplished using an open technique, optical trocar insertion, or preinsufflation with a Verses needle followed by trocar placement. The location of the first 10–12 mm trocar, as well as the insufflation pressure, were adjusted according to the fundal level and the physiology of the pregnant lady. Otherwise, the location of the first trocar was in the supra- or infra-umbilical crease and the insufflation pressure was 10–15 mmHg. The other working ports were placed according to the site of the intervention. The next step includes Exploration of the abdomen, followed by aspiration of any intraperitoneal collection, followed by definitive treatment of the causative factor for the acute abdomen. Lastly, a peritoneal toilet was performed, and an abdominal drain was inserted if necessary.

Postoperative follow-up

Postoperative care was given for these patients, including assessment of the vital signs and other clinical situations for the mother and her fetus. Fetal ultrasonography was performed on the postoperative day (POD) 1. Additionally, observation for any possible complications either early (during the hospital stay) or late (30 days postoperatively) was recorded.

Study variables and measurements

This study aimed to evaluate the value of laparoscopy in diagnosing and managing the acute abdomen state in pregnant women. Our participants included every

pregnant woman having laparoscopic intervention because of acute abdominal pain during any trimester of her pregnancy.

Patients were analyzed as regards the operative time, intraoperative bleeding, and conversion rate, postoperative length of hospital stays (LoS), as well as any postoperative outcomes at the early and late stages, including wound sepsis and dehiscence, peritonitis or intraabdominal abscess, gastrointestinal fistula, jaundice, biliary leakage, biliary stricture, cholangitis, and recurrent stones. Bowel opening, defined as the first passage of stool or flatus, postoperatively was assessed after the procedure. Additionally, the postoperative fetal outcomes were studied.

Postoperative infective complications, including peritonitis, wound infection, and cholangitis, were assessed clinically, by laboratory tests (complete blood count and C-reactive protein) or by imaging studies (abdominal ultrasonography). Postoperative LoS was started from the day after surgery until the day of discharge.

Statistical analysis

Continuous variables were expressed as means and standard deviation, while categorical variables were presented as percentages. Quantitative variables were compared with the independent-sample t-test. For qualitative variables, Pearson χ^2 tests were used after assumptions had been verified. A 95% confidence interval was reported for both measures. A P value less than 0.05 was considered statistically significant. All statistical tests were performed using IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp, Version 20.

Results

Participants and descriptive data

During the recruitment period, 45 patients matched our eligibility criteria and were included in our study. The details of the clinicopathological features of our participants are shown in Table 1. We found that the laparoscopic value exceeds the therapeutic aim, but it has an essential role in diagnosing acute abdominal pain during pregnancy. Among our participants, 53.3% were diagnosed by laparoscopy and the remaining through ultrasonography. We did not need to perform any radiological imaging using ionizing radiation.

Inflammation (86.7%), including acute appendicitis (89.7%, Figs 1 and 2) and cholecystitis (10.3%), were found to be the most common causes of acute abdomen. The obstetric causes included 4.4% of ectopic pregnancies. The gynecological causes (8.9%) were ovarian torsion and torsion of a Morgagni cyst of the ovary, Fig. 3.

Table 1 Preoperative and operative data of the study participants

Variable	Laparoscopic intervention
Preoperative Clinicopathological Data	
Age	27.80±3.12
Diagnostic tool (US/Laparoscopy)	21 / 24
Pathological causes	
Inflammatory	39 (86.7)
Ectopic pregnancy	2 (4.4)
Gynecological causes	4 (8.9)
Trauma	0
Benign lesion	0
Malignant lesion	0
Trimester	
First	17 (37.8)
Second	21 (46.7)
Third	7 (15.5)
Peritonitis	6 (13.3)
WBCS	9860±3599
Operative Data	
Procedure	
Appendicectomy	35 (77.8)
Cholecystectomy	4 (8.9)
Ovarian cystectomy	2 (4.4)
Salpingectomy	2 (4.4)
Untwisting of ovaries	2 (4.4)
Operative time	46.71±16.24
Operative complications	0
Blood transfusion	2 (4.4)
Insufflation pressure	12.58±0.988
Conversion rate	0

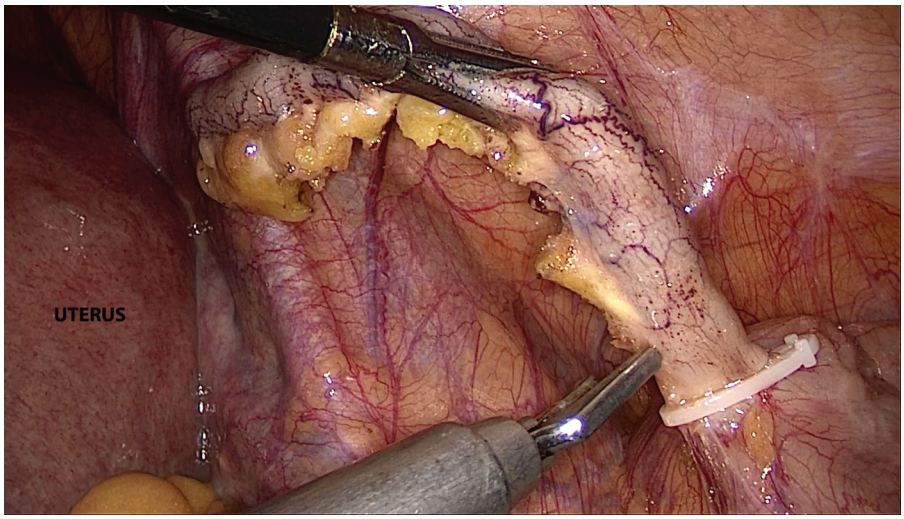
The second trimester represents the most common period that presents acute abdominal pain (46.7%), followed by the first trimester (37.8%), and lastly comes the patients in the third trimester (15.5%), Fig. 4. Only six patients were presented with generalized peritonitis among the studied group.

Regarding the operative data, both patients with ectopic pregnancies required intraoperative blood transfusion (4.4%). No intraoperative complications were reported. In most cases, we kept the insufflation pressure slightly lower, 12 mmHg in 73.3% of the included participants, while the remaining patients were insufflated at a pressure of 14 mmHg.

Outcome data and main results

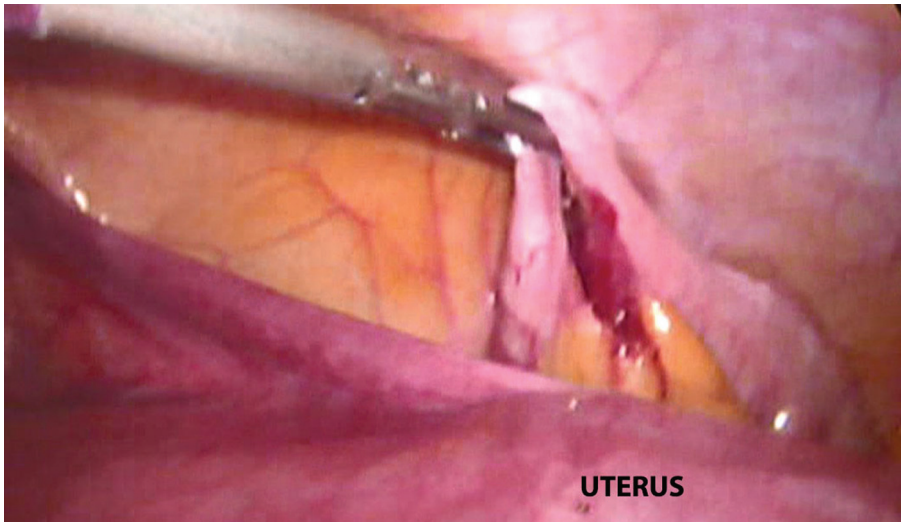
93.3% of our patients were instructed for early feeding, resulting in rapid bowel opening at POD 1 in 68.9% and POD 2 in 26.7% of our participants.

Figure 1



Laparoscopic appendicectomy during pregnancy.

Figure 2



Laparoscopic appendicectomy at the third trimester of pregnancy.

Table 2 shows no postoperative morbidity, including infection, sepsis or wound dehiscence, was reported during the first 30 days. Similarly, no postoperative mortality was detected. Moreover, no cases had abortions during their conception time.

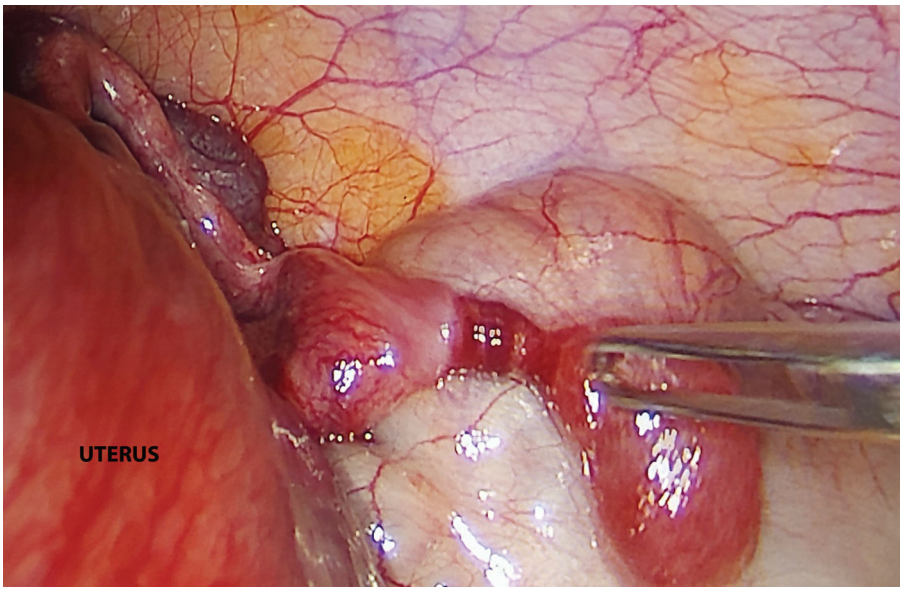
Discussion

One of the most challenging diagnostic and treatment difficulties today is the acute abdomen in pregnancy. One in 500 pregnancies experience acute abdominal pain. Despite advances in medical technology, the preoperative diagnosis of the causative pathology is still unclear. When laparoscopy is used as a diagnostic tool, such conditions can be identified earlier, with greater accuracy and less risk [1]. Several studies described many advantages of the value of laparoscopy during pregnancy [6–12].

In our study, 53.3 % were diagnosed by laparoscopy without the need to perform any harmful radiological interventions. The most common pathology of acute abdominal pain during pregnancy was acute appendicitis. Similarly, many studies found the same results [1,13].

The second trimester is considered the most common period of presentation of acute abdominal diseases.

Figure 3



Laparoscopic untwist and resection of an ovarian Morgagni cyst.

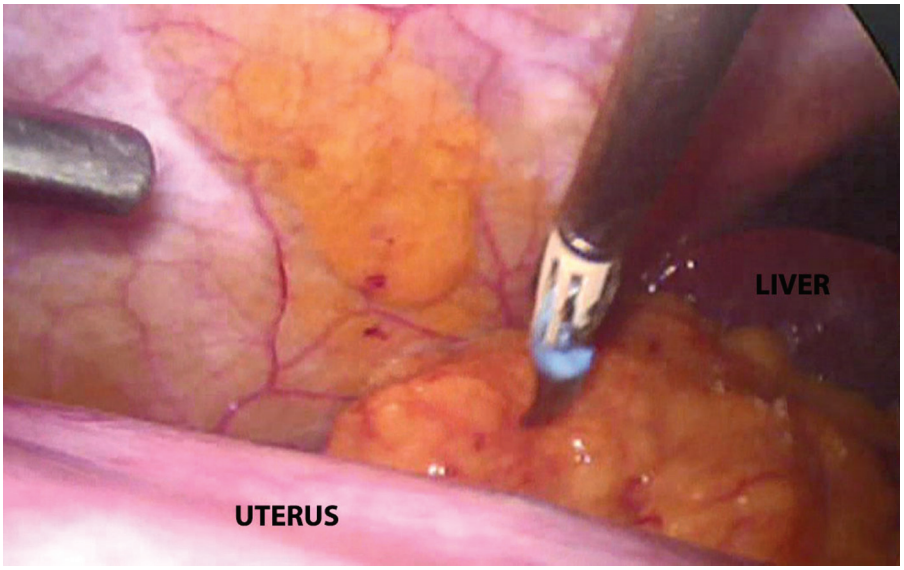
This could be due to 2 factors: a mechanical factor of the enlarged uterus pushing and compressing the surroundings with subsequent delayed drainage or twisting of these organs. The possible second factor is hormonal, which is getting high in concentration during this trimester with further viscid secretions. The cholestasis during pregnancy is a clear explanation for the hormonal factors.

The laparoscopic tool between experienced hands represents a time-preserving with a rapid decision for diagnosis and management. The mean operative

Table 2 Postoperative outcomes of laparoscopic interventions during pregnancy

Outcome	Laparoscopic intervention
Bowel opening	
POD 1	31 (68.9)
POD 2	12 (26.7)
POD 3	2 (4.4)
Early feeding	42 (93.3)
Peritonitis	0
Wound infection	0
Wound dehiscence	0
Abortion	0

Figure 4



Laparoscopic intervention during the third trimester.

time among our participants was 46.71 ± 16.24 without any intraoperative complications. As recommended by SAGES, the insufflation pressure was kept a little bit lower than usual in a nonpregnant patient. This is to avoid aortocaval compression and further circulatory collapse or lower limb venous thrombosis in a susceptible patient.

In our study, postoperative enhanced protocol with early feeding and ambulation was achieved in about 93% of our patients. No postoperative peritonitis, wound infection or wound dehiscence were detected. Regarding the fetal state, no cases of abortion were recorded between our patients compared with more incidence among patients with open procedures in our experience. Other studies reported similar results confirming the safety of laparoscopic intervention during pregnancy [14–16]. Hence, the laparoscopic value exceeds the expectations regarding the study outcomes with less postoperative pain, early ambulation, and faster recovery compared with the open surgical interventions.

The limitation of this study is that it is a noncomparative study. We encourage a prospective comparative study with more participants to make strong evidence for the beneficial role of laparoscopy during pregnancy.

Conclusion

Laparoscopic value exceeds the treatment advantages but has a significant role in diagnosing the etiologies of acute abdomen during pregnancy. Laparoscopy could successfully treat different pathologies during pregnancy. No restriction for the time of conception regarding the use of laparoscopy was reported. Further comparative studies regarding laparoscopic use during pregnancy should be conducted.

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Nil.

Conflict of interest

There are no conflicts of interest.

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