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ORIGINAL RESEARCH

The Management of Ovarian Cysts During Pregnancy In Urgent Situations Through Laparoscopic Procedure

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ABSTRACT

Aim: The study was designed to assess the laparoscopic management of ovarian cysts at advanced gestational ages in emergent situations.

Materials and methods: In the department of obstetrics and gynaecology, a prospective study was conducted on a sample of pregnant women who required emergency ovarian operations and underwent laparoscopy. The investigation included a total of 50 pregnant women in their first and second trimesters. Gravida, parity, medical history, main complaints, gestational age, cyst size and characteristics (e.g., unilateral or bilateral, pathological type), operation duration and changes in haemoglobin (Hb) levels before and after the operation were all recorded as patient data. Additionally, all patients underwent preoperative ultrasonographic examinations prior to their operations. The Chi-square test and the t-test were employed to analyse all qualitative and quantitative variables, respectively. $P < 0.05$ was used to determine the significance level.

Results : The average age of the study participants was 35 years, with a standard deviation of 4.6 years. Parity 1 was present in the majority of patients (44%). The mean body mass index of the preponderance of patients (50%) was within the 25–30 range. The gestational age at the time of surgery was 18.4 weeks. The majority of patients (74%) were in their second trimester of pregnancy. A cyst in the ovary was inadvertently observed by the majority of patients (58%) during pregnancy, and they intended to undergo elective surgery during the course of their pregnancy. All of the women had given birth after 38.3 weeks of gestation. The average duration of the operation was 46 minutes. Based on the intraoperative findings, the average cyst size was 8.2 cm. The most frequently diagnosed pathology was mature teratoma (26%), followed by haemorrhagic cysts (22%), endometriomas, and luteal cysts (16%). In 12% of patients, total oophorectomy was performed further due to the presence of multilocular ovarian cysts, minor projections of cyst walls, and a high likelihood of malignancy. Ovarian torsion and cyst rupture were diagnosed in an additional 46% and 34% of patients, respectively. Additionally, 10% of the women required tocolytic therapy.

Conclusion: The study's results confirmed that laparoscopic surgery can be performed safely and effortlessly during pregnancy, with no maternal or neonatal complications, even in emergency situations such as ruptured ovarian cysts or ovarian torsions.

Keywords: congenital heart disease, PDA, ASD, VSD, device closure, transcatheter intervention, Amplatzer, Cocoon occluder.

INTRODUCTION

A unusual condition, a large ovarian cyst with an accumulation of fluid within, necessitates immediate diagnosis and treatment. It may be a neoplastic cyst or a functional cyst, such as a follicular cyst, corpus luteum cyst, theca lutein cyst or chocolate cyst.[1]

Although the majority of patients are asymptomatic and the cysts were discovered accidentally through

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bimanual examination or ultrasound, symptomatic patients frequently experience abdominal discomfort. Pain may manifest as a dull soreness or discomfort in the lower back or abdomen. Occasionally, patients present with protracted infertility, and an enormous ovarian cyst is an unintentional discovery. Complicated ovarian cysts, torsion, infarction, or haemorrhage may give rise to acute, severe discomfort.[2]Torsion of cysts, infection, and adhesion formation are uncommon presentations; however, they are associated with an elevated morbidity.

A comprehensive medical history and a comprehensive physical examination should be included in any evaluation of a patient with an ovarian cyst to identify any potential warning indications of malignancy. Risk factors and red flags for malignancy should be the primary focus of the medical history.[3]The incidence of incidental ovarian cyst diagnoses is increasing as ultrasound imaging becomes more common in obstetric examinations. The overwhelming majority of these adnexal masses are ovarian cysts. The incidence rate of adnexal masses complicating pregnancy ranges from 0.05% to 2.4%, with only 1% to 6% of them being malignant, according to previous studies.[4]

The majority of these cysts are resolved spontaneously as pregnancy progresses, as they are physiological in nature. However, in a few cases, urgent interventions are necessary due to their acute complications.[5]Thus far, the surgical management of benign ovarian masses has been demonstrated to be preferable to conventional laparotomy through laparoscopy.[6]Nevertheless, surgeons are faced with a variety of technical challenges, including the insertion of trocars, the location of trocars, uterine injury, and cyst ruptures, as well as the management of large ovarian masses, advanced gestational age, and emergency surgery. The other concerns regarding laparoscopy during pregnancy include neonatal malformations, preterm birth, and foetal acidosis, which are caused by pneumoperitoneums.[7,8]

Therefore we designed this study to evaluate the laparoscopicmanagement of ovarian cysts at advanced gestational ages under urgent situations.

MATERIALS AND METHODS

After receiving approval from the ethical committee, this prospective study was conducted on a sample of pregnant women who required emergency ovarian operations and underwent laparoscopy in the obstetrics and gynaecology department. The investigation included a total of 50 pregnant women in their first and second trimesters. Informed consent was collected from all patients in writing.

Inclusion criteria

Women who are in the first and second trimesters.

Exclusion criteria

Those patients who have limitations due to medical conditions.

Patients who are unwilling to undergo laparoscopic surgery.

Methodology

- Patients' data included gravida, parity, medical history, main complaints, gestational age, cyst size and characteristics (e.g., unilateral or bilateral, pathological type), operation time and changes in haemoglobin (Hb) levels before and after the operation.
- All clinical data obtained from the patients and recorded in their files, including whether the patient had a history of ovarian cysts prior to pregnancy, had accidentally discovered a cyst in her ovary during pregnancy, had planned for elective surgery of her ovarian cyst during pregnancy before emergencies arose, or had desired to be monitored during pregnancy and sought treatment after the pregnancy had ended, was documented.
- All patients underwent additional preoperative ultrasonographic examinations prior to their operations. Acute abdominal symptoms, cyst rupture, ovarian cyst torsion, and excruciating pain were among the factors that required emergency surgery.
- The surgery also employed the Trendelenburg position at a 15°–25° angle and a gas pressure of less than 18 mmHg. The primary trocar was inserted into the abdomen at a distance of 2 cm above the umbilicus in cases where the uterus's height was below the umbilicus. The primary trocar was inserted 4–6 cm above the umbilicus in cases where the uterine fundal height was above the umbilicus.
- The sole distinction between laparoscopic techniques was the modification of the primary and secondary trocar implantation in accordance with the gestational age and the side of the body where the pathology was located. The port entrance was engineered to ensure that the uterus or adnexal lesion was at least 6 cm from the apex of the instrument or telescope.
- Direct peritoneal access was additionally employed inmost of the patients except for the cases of advancedgestational age, in which intraperitoneal gas insufflation wasperformed through left subcostal Veress needle placementbefore primary port insertion. Other accessory trocars werealso placed based on the patients' condition and the cystcharacteristics.

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- In certain instances, ovarian sutures were implemented. Additionally, the pregnancy was preserved through minimal uterine manipulation. The majority of cysts, particularly functional hemorrhagic cysts and endometriomas, were evacuated prior to resection in order to simplify the procedure and reduce the need for uterine manipulation. After surgery, all patients received 50 mg of injectable progesterone twice daily for a period of 10 days.
- Additionally, all patients were adequately hydrated. Additionally, intravenous paracetamol was implemented to alleviate postoperative discomfort. Additionally, all patients underwent postoperative ultrasonographic study to assess their foetal status. Subsequently, all patients were evaluated for changes in haemoglobin levels and operation duration.

STATISTICAL ANALYSIS

Additionally, descriptive statistics, such as the mean, standard deviation, frequency and percentage, were implemented to investigate the data. The Chi-square test and the t-test were employed to analyse all qualitative and quantitative variables, respectively. $P < 0.05$ was used to determine the significance level.

RESULTS

Table 1 illustrated that the mean age of study participants was 35±4.6 years. Majority of patients (44%) had parity 1 followed by nulliparous (30%), parity 2 (20%) and parity 3 (6%). The majority of patients (50%) had the mean body mass index was in the range of 25–30. Gestational age at the time of surgery was 18.4 weeks. Maximum fraction of patients (74%) were in their 2nd trimester of pregnancy followed by 1st trimester (26%).

Table 1: Demographic features of women who underwent laparoscopic surgery

Variables		N (n=50)	Percentage (%)
Age (mean±SD)	35±4.6		
Parity	0	15	30%
	1	22	44%
	2	10	20%
	3	3	6%
BMI	<20	8	16%
	20-24.9	17	34%
	25-30	25	50%
Gestational age at surgery (weeks)	18.4		
1st trimester		13	26%
2nd trimester		37	74%
3rd trimester		0	0

Table 2: Demographic features

Variables	N (n=50)
Operation time (min)	46.0
Gestational week at delivery	38.3
Women accidently noticed cystectomy in pregnancy	29 (58%)
Previous history of cystectomy	4 (8%)
Planned for elective surgery after pregnancy	24 (48%)
Planned for elective surgery during pregnancy before emergencies arise	27 (54%)

Table 2 depicted that a cyst in the ovary was inadvertently observed by the majority of patients (58%) during pregnancy, and they intended to undergo elective surgery during the course of their pregnancy. The women had all given birth after 38.3 weeks of gestation, and there were no significant intra-abdominal adhesions in the cases of caesarean section (C-section). The serum haemoglobin level did not experience a significant decrease, and the average operation time was 46 minutes. The mean end-expiratory carbon dioxide (CO_2) pressure was 34 mmHg (ranging from 30 to 39 mmHg), and the intraabdominal pressure was 15 mmHg (the range was 12 to 17 mmHg). The Trendelenburg position was at an average 20° angle to the operating table. The intraoperative findings indicated that the mean cyst size was 8.2 cm.

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Table 3: Cystectomy characteristics based on laparoscopic and pathologic findings

Variables		N (n=50)	Percentage (%)
Cystectomy size, mean (SD)		8.2±1.4	
Cystectomy pathology	Hemorrhagic cyst	11	22%
	Luteal cysts	8	16%
	Mature teratoma	13	26%
	Endometrioma	8	16%
	Serous cystadenoma	7	14%
	Mucinous cystadenoma	3	6%
Cystectomy		44	88%
Oophorectomy		6	12%
Intraperitoneal adhesions		5	10%
Ovarian torsion		23	46%
Cystectomy rupture		17	34%
Massive intraperitoneal hemorrhage		3	6%
Blood transfusion		5	10%
Tocolytic therapy		5	10%

The most frequently diagnosed pathology was mature teratoma (26%), followed by haemorrhagic cysts (22%), endometriomas, and luteal cysts (16%). In 12% of patients, total oophorectomy was performed further due to the presence of multilocular ovarian cysts, minor projections of cyst walls, and a high likelihood of malignancy. Ovarian torsion and cyst rupture were diagnosed in an additional 46% and 34% of patients, respectively. Additionally, tocolytic therapy was required in 10% of women with advanced gestational age and relatively more uterine manipulation. The average gestational age at delivery was 38.3 weeks. Additionally, all of the infants achieved normal Apgar scores. (Table 3)

DISCUSSION

Managing ovarian cysts during pregnancy can be a difficult task for both the patient and the obstetrician. While the majority of adnexal masses in pregnancy are inadvertently identified during the first-trimester ultrasound imaging, approximately 1%–2% of these masses may complicate pregnancy and necessitate surgical interventions.[9]

Laparotomy has been the standard method of surgical management for ovarian masses in pregnancy, as it allows for the most effective access to the upper abdomen and pelvic. The drawbacks of open laparotomy include the need for extended hospital stays during the recovery process, the increased number of postoperative pains that result from the large incisions, the long-term immobilisation that can lead to thromboembolism in susceptible women, the need for additional uterine manipulation, and the financial inefficiency of the length of hospital stays.[10] The feasibility and safety of laparoscopic surgeries during pregnancy have been the subject of numerous studies as a result of these conditions.[11]The potential benefits of laparoscopic surgeries include a reduction in morbidity, an earlier discharge from the hospital, a reduction in postoperative pains, a reduction in adhesion formation, more acceptable cosmetic results, a reduction in wound infections, a reduction in blood loss, a faster recovery, and an earlier return to typical activities.

Other advantages of such minimally invasive procedures were also revealed by the present study, including a reduced risk of preterm labour and a reduced need for uterine manipulation. This could be attributed to the availability of sufficient space in the upper abdomen to perform the operation without uterine manipulation, as well as improved intraperitoneal vision during laparoscopic surgery. This minimally invasive surgery is more cost-effective than laparotomy due to all of these advantages.

In the majority of the previous studies carried out by Thepsuwan J et al[12] and Lee CL et al[13], surgeries were performed in non-emergency conditions at an early gestational age, and only a small number of studies were conducted during an emergency at an advanced stage of pregnancy. The current investigation was conducted in an urgent situation, such as ovarian torsion or cyst rupture, during the first or second trimesters, with a maximum gestational age of 24 weeks. Additionally, all of the patients were in need of emergency interventions due to their critical conditions. The maximal length of surgery for patients with ruptured teratomas and intraperitoneal haemorrhage was 85–90 minutes, despite the emergency.

The maximum gestational age was less than 19 weeks during surgery in previous investigations conducted by Peng P et al[11] and Moreno-Sanz C et al[14]. This was as a result of the apprehension regarding the insertion of trocars into the uterus or the potential for uterine harm from surgical instruments. The intraoperative monitoring of CO2 in expectant women is adequately

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achieved through the measurement of end-tidal CO2 pressure (capnography). Respiratory acidosis can be prevented by maintaining the end-tidal CO2 level at 32–34 mmHg. If maternal acidosis is confirmed, it should be reversed through maternal hyperventilation and a reduction in intraabdominal pressure. These have the potential to revive the foetus by enhancing foetal oxygenation and placental blood flow.[15]The mean end-tidal CO2 pressure in this study was 34 mmHg. This investigation did not identify any instances of maternal acidosis. Additionally, there were no instances of intraoperative foetal monitoring.

Foetal loss may occur in an additional 4%–5% of all pregnancies following laparoscopic operations or laparotomies, as per Corneille MG et al[16]. In the event of pre-term labour indications, Pearl J et al[17] recommended that tocolytic therapy be considered either before or after the surgery. Additionally, there were no instances of preterm labour or miscarriage in the current investigation. Additionally, five patients who exhibited severe abdominal pain as a result of a ruptured cyst had received tocolytic therapy postoperatively. The results of the study indicated that the routine use of tocolytic therapy after surgery was not necessary during pregnancy; it was only necessary in the event of threatened preterm labour. Subsequent to discharge, comprehensive perinatal care was implemented. Neither a low APGAR score at delivery nor any adverse effects during pregnancy were observed.

Twenty patients in this study were cognisant of ovarian fibroids prior to their pregnancy. They were denied surgery to prevent the depletion of their ovarian reserve. Adnexal surgery may diminish ovarian reserve in certain pathologies, including endometriomas; however, it is unlikely to have any impact on ovarian reserve in other forms of adnexal surgery.[18]Consequently, it is logical to perform surgical resection of larger ovarian cysts prior to conception in order to reduce the risk of complications during pregnancy.

Twenty-four patients in the current study had intended to undergo elective surgery subsequent to their pregnancy. In all cases, antepartum surgery was performed as a result of the urgency of the situation. Ovarian torsion is a prevalent potential complication associated with the expectant management of ovarian masses during pregnancy, as evidenced by comparable studies conducted by Schmeler KM et al[19] and Tavoli Z et al[20]. This complication is observed in 6%–7% of cases. In this regard, the most prevalent cause of emergency surgery in this investigation was ovarian torsion. The high prevalence of ovarian torsion in this study, in contrast to previous research, is attributed to the selection of cases. Ovarian torsion was the most frequently diagnosed pathology, as all of the patients in this study required emergency surgery.

CONCLUSION

In pregnancy, minimally invasive surgeries may be the preferred method. The study's results confirmed that laparoscopic surgery can be performed safely and effortlessly during pregnancy, with no maternal or neonatal complications, even in emergency situations such as ruptured ovarian cysts or ovarian torsions.

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