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Surgical Management of Adnexal Masses in Pregnancy

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ABSTRACT

Background and Objectives: Our objective was to review the surgical management, surgical outcomes, and obstetric outcomes of adnexal masses in pregnancy.

Methods: A retrospective review was performed of pregnant women before 20 weeks of gestation who underwent laparoscopy or laparotomy for management of an adnexal mass during the period of January 2005 to June 2012 at a university-affiliated hospital.

Results: Thirty-five pregnant women underwent surgical removal of adnexal masses during the 7.5-year study period: 21 (60.0%) underwent laparoscopic surgery, and 14 (40.0%) underwent laparotomy. The left upper quadrant entry technique was used in 20 women. Conversion to laparotomy was required in 2 women because of extensive pelvic adhesions. The mean gestational age at surgery was 15.2 ± 1.9 weeks. All women had undergone ovarian cystectomy. A malignant mass was found in 3 (8.6%) women. The laparoscopy group had a significantly less blood loss (67.4 ± 55.8 vs 153.6 ± 181.0 mL, $P = .048$) and shorter mean hospital stay (2.8 ± 1.0 vs 3.8 ± 1.1 days, $P = .006$) than the laparotomy group. One woman miscarried soon after surgery. There was no significant difference in obstetric outcomes between the laparoscopy and laparotomy groups.

Conclusion: Surgical management of adnexal masses during pregnancy appears to have favorable outcomes for the mother and the fetus.

Key Words: Adnexal masses, Pregnancy, Laparoscopy.

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INTRODUCTION

The incidence of adnexal masses during pregnancy before 14 weeks of gestation varies from 6% to 25% in longitudinal studies.[1,2] Most of these adnexal masses are functional ovarian cysts and generally resolve during pregnancy, leaving between 0.7% and 1.7% of women with persistent masses.[1,2] Although ovarian cyst torsion, hemorrhage, or rupture leading to abdominal pain are uncommon in pregnancy, some women may require emergency surgery for these complications. Women with persistent masses may also opt for surgery in the second trimester of pregnancy if malignancy is suspected on ultrasonography images or to prevent cyst complications, which may necessitate emergency surgery in the third trimester, which adds an increased risk of complications.[3] In a study by Whitecar et al, women who underwent laparotomy after 23 weeks' gestation had a >50% risk of adverse perinatal outcome.[3]

Traditionally, laparotomy has been used to remove adnexal masses during pregnancy. However, increasing evidence suggests that laparoscopic treatment of adnexal masses in pregnancy is safe and effective.[4–6] Various laparoscopic entry techniques such as open Hassan, Palmer's point, or left upper quadrant (LUQ) entry have been used in pregnancy.

In this retrospective study, we review the surgical management of adnexal masses in pregnant women and assess their surgical and obstetric outcomes.

MATERIALS AND METHODS

Queen Mary Hospital is a regional university-affiliated hospital with approximately 4000 deliveries per year. Ethical approval was obtained from the local institutional review board. From the operation list database we identified pregnant women who underwent surgery for adnexal mass before 20 weeks of gestation during the period between January 2005 and June 2012. All surgical procedures were recorded in a clinical database immediately after surgery (Clinical Management System, Hospital Authority, Hong Kong). A retrospective review of the database was performed for all patients. A database was set up with Microsoft Excel for Windows (Redmond, Washing-

ton, USA) to facilitate data entry and retrieval. Demographic data, ultrasonography findings, indications for surgery, operative procedure, intraoperative findings and diagnosis, histology reports, and complications were recorded. Obstetric outcomes of the pregnancy were reviewed when available. Results were expressed as proportions and mean and standard deviation when appropriate. Findings of women who underwent laparoscopy ("Laparoscopy" group) were compared with women who underwent laparotomy ("Laparotomy" group) using the t test for continuous variables that were normally distributed or the Mann-Whitney U test if they were not normally distributed, and the Fisher exact or χ^2 tests for dichotomous outcomes. Statistical significance was set as 5%.

The treatment of each woman was individualized and determined by the clinical symptoms, gestational age, ultrasonography findings, and the woman's choice. Magnetic resonance imaging or computed tomography was not routinely performed. CA-125 levels were not measured. All surgeries were performed under general anesthesia by either a senior surgeon or a senior resident under supervision. In our unit, laparoscopic surgery was generally preferred for women with a mean cyst diameter of <10 cm, whereas laparotomy was performed for women with a mean cyst diameter of >10 cm; but flexibility of this approach was allowed at the discretion of the operating gynecologist. For laparotomy, a suprapubic transverse or subumbilical midline skin incision was made based on mass size, preoperative scarring, or the sur-

geon's preference. For laparoscopy, closed laparoscopic entry with the left upper quadrant approach or umbilical approach was used based on gestational age, mass size, previous surgery, or the surgeon's preference. The techniques of the LUQ approach in our institution have been described previously.[7] In summary, after general anesthesia was administered, a nasogastric tube was inserted to decompress the stomach. Then a small skin incision was made at the ninth or tenth intercostal space at the anterior axillary line, and a Veress needle was inserted. A pneumoperitoneum was created by insufflation of carbon dioxide until an abdominal pressure of 25 mm Hg was achieved. A second skin incision of 6 to 7 mm was made just below the left subcostal margin and a 6-mm cannula was inserted. The peritoneal cavity was visualized with a 5-mm 0-degree laparoscope, and secondary ports were inserted at the lower quadrants under direct vision.

RESULTS

During the 7.5-year study period, 35 pregnant women underwent surgery for adnexal masses before 20 weeks of gestation. The clinical characteristics of the women are presented in **Table 1**. Overall, in 30 (85.7%) women, the adnexal masses were detected incidentally on ultrasonography during the women's first trimester of pregnancy: 4 (11.4%) presented during the first trimester with abdominal pain, and 1 (2.9%) presented with abdominal distention. The indications for surgery in 33 women were persistent adnexal mass or suspicion of malignancy. Two

Table 1.
Patient Characteristics and Surgical Outcomes

	Total (N = 35)	Laparoscopy (n = 21)	Laparotomy (n = 14)	P value
Characteristics				
Age (y)	31.5 ± 5.4	31.4 ± 4.3	31.6 ± 7.0	.911
Parity	0.3 ± 0.5	0.2 ± 0.5	0.3 ± 0.5	.789
Gestational age at surgery (wk)	15.2 ± 1.9	15.1 ± 1.8	15.4 ± 2.2	.701
Mean cyst diameter (cm)	7.9 ± 2.1	6.9 ± 1.4	9.5 ± 1.9	< .001
Emergency surgery, n (%)	2 (5.7)	0 (0)	2 (5.7)	.153
Bilateral mass, n (%)	4 (11.4)	1 (2.9)	3 (8.6)	.279
Surgical outcomes				
Operative time (min)	82.5 ± 40.5	92.5 ± 44.4	67.6 ± 29.3	.074
Blood loss (mL)	101.9 ± 127.3	67.4 ± 55.8	153.6 ± 181.0	.048
Hospital stay (d)	3.2 ± 1.1	2.8 ± 1.0	3.8 ± 1.1	.006

Values are presented as mean ± standard deviation, except where otherwise indicated.

women with incidentally detected adnexal mass required emergency surgery at 14 and 17 weeks of gestation, respectively, for suspected torsion; however, torsion was not confirmed at surgery. All except one woman underwent surgery in the second trimester of pregnancy; one woman had surgery performed at 11 weeks of gestation because of suspicion of malignancy.

Of the 35 women, 23 (65.7%) underwent laparoscopy and 12 (34.3%) underwent laparotomy. For laparoscopic entry, 20 (87.0%) women underwent the LUQ approach and 3 (13.0%) underwent the umbilical approach. The intended surgery was completed laparoscopically in 21 (91.3%) women, whereas 2 (8.7%) required conversion to laparotomy because of extensive pelvic adhesions. The 2 women who required conversion to laparotomy were included in the laparotomy group for analysis. Of 14 women who underwent laparotomy, 7 (50%) had a suprapubic transverse skin incision and 7 (50%) had a subumbilical midline incision. All women underwent an ovarian cystectomy. For laparoscopic surgery, the cysts were removed using a specimen retrieval bag. The laparoscopy group had significantly less blood loss and a shorter mean hospital stay than did the laparotomy group (**Table 1**). One woman who had laparoscopic surgery had postoperative acute retention of urine requiring insertion of a Foley catheter, which was removed after 1 day.

The pathologic diagnoses are presented in **Table 2**. Overall, the diagnoses were benign masses in 32 (91.4%) women and malignant masses in 3 (8.6%) women. After ovarian cystectomy at 13 weeks of gestation, the woman with a borderline mucinous ovarian tumor was treated conservatively during the rest of her pregnancy and de-

Table 2.
Pathologic Diagnosis

Pathologic diagnosis	N (%)
Benign mass	
Mature cystic teratoma	15 (42.8)
Endometrioma	7 (20.0)
Corpus luteum	3 (8.6)
Mucinous cystadenoma	3 (8.6)
Serous cystadenoma	2 (5.7)
Others	2 (5.7)
Malignant mass	
Borderline mucinous tumor	1 (2.9)
Clear cell carcinoma	2 (5.7)

livered at 38 weeks' gestation. The two women with ovarian clear cell carcinoma were given chemotherapy during pregnancy: one received carboplatin and paclitaxel and delivered at 38 weeks' gestation; the other, with small focus of clear cell carcinoma in an endometrioma, received carboplatin and delivered at 36 weeks' gestation. All 3 women with malignant masses had cesarean delivery followed by surgical staging in the same setting, and all of the specimens were negative for malignancy.

The obstetric outcomes were available for 33 women (**Table 3**). There was one pregnancy loss, which occurred 2 days after surgery in a woman who had a planned laparotomy at 20 weeks' gestation; she had a spontaneous miscarriage after she developed abdominal pain and vaginal bleeding and was found to have a fully dilated cervix with bulging forewaters. There were no significant differences in the obstetric outcomes between the laparoscopy or laparotomy groups. All women delivered after 35 weeks' gestation with good obstetric outcomes.

DISCUSSION

The results of the present study demonstrate that surgical management of adnexal masses in pregnancy appears to be safe, with respect to both the mother and the fetus, with comparable surgical and obstetric outcomes between women who underwent laparoscopy and those who underwent laparotomy.

Although several studies have reported the safety of adnexal mass removal during the first trimester of pregnancy,[8,9] it is generally avoided to allow time for spontaneous resolution and to reduce the risk of spontaneous miscarriage. However, delaying surgery until the second trimester of pregnancy poses a technical challenge, especially if laparoscopic surgery is performed. One potential complication is inadvertent injury of the gravid uterus by the Veress needle or trocar, causing bleeding, leakage of amniotic fluid, or miscarriage.[10] Furthermore, there may be difficulty achieving adequate visualization because of the limited space between the laparoscope and the adnexal mass, especially if the umbilical trocar is used for laparoscope insertion.

The recommended laparoscopic entry technique in pregnancy includes the LUQ approach or the open laparoscopic approach.[11] The LUQ approach has been used extensively in patients at high risk for periumbilical adhesions. Recently, laparoscopic removal of adnexal masses in the second trimester of pregnancy using the LUQ approach has been shown to be feasible and safe.[7,12] Stepp

Table 3.
Obstetric Outcomes

	Total (N = 33)	Laparoscopy (n = 20)	Laparotomy (n = 13)	*P* value
Gestational age at delivery (wk)	38.5 ± 1.4	38.4 ± 1.5	38.5 ± 1.2	.880
Birth weight (g)	3178.9 ± 379.0	3188.8 ± 343.5	3163.6 ± 445.6	.867
Apgar score				
At 1 min	8.6 ± 1.4	9.1 ± 0.9	7.9 ± 1.6	.028
At 5 min	9.6 ± 0.6	9.8 ± 0.6	9.5 ± 0.7	.238
Preterm birth (<37 wk), n (%)	3 (9.1)	2 (10.0)	1 (7.7)	1.000
Cesarean delivery, n (%)	13 (39.4)	8 (40.0)	5 (38.5)	1.000
Threatened miscarriage, n (%)	2 (6.1)	2 (10.0)	0 (0.0)	.508
Pregnancy loss, n (%)	1 (3.0)	0 (0.0)	1 (7.7)	.394

Values are presented as mean ± standard deviation, except where otherwise indicated.

et al[12] reported the use of the LUQ approach in 7 women for treatment of adnexal mass in the second trimester of pregnancy, with no maternal or fetal complications. In the present study, 20 women underwent laparoscopy using the LUQ approach in the second trimester of pregnancy at a mean gestational age of 15 weeks. There was no complication related to entry technique, namely, inadvertent injury to the gravid uterus or ovarian cyst by the Veress needle or trocar. In our experience, another advantage of the LUQ approach compared with the open approach with placement of the trocar at the umbilicus is that it provides better panoramic vision by allowing adequate distance between the laparoscope and the adnexal mass. Moreover, most of the intended surgeries were completed without the need for an additional trocar at the umbilicus.

One of the main concerns with an adnexal mass is the risk of malignancy. In most of the published series, the reported incidence of ovarian cancer in pregnancy ranges from 1 in 5000 to 1 in 47 000 live births, with 2% to 6% of persistent adnexal masses found to be malignant.[13] In the present study, the rate of malignancy was 1 in 10 000 live births, or 8.6% of persistent masses, which is comparable with the reported rates. However, in a retrospective study of 60 adnexal masses resected during pregnancies over a 12-year period, Sherard et al[13] reported a malignancy rate of 13%, which was more than twice the previously reported incidence. Most of the reported rates of malignancy, including that in the present study, derive from retrospective studies, which have limitations. The rates depend on the selection criteria by which an adnexal mass would be removed during pregnancy. In longitudinal studies that evaluated the prevalence of adnexal mass in early pregnancy and then observed the natural history of the mass through pregnancy, the rate of malignancy was found to be lower.[1,2]

Our study has limitations. We included only women who underwent surgery before 20 weeks' gestation, and we do not have information on women who underwent surgery later in pregnancy. Moreover, definite conclusions cannot be made from the small number of patients. However, our findings help us when counseling women with adnexal masses during pregnancy in reassuring them that surgical management of the masses appears to be safe for the mother and the fetus.

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