CASE REPORT

Surgical intervention for adnexal masses during pregnancy

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SUMMARY

We aimed to evaluate the influence of surgical intervention on gestational and neonatal outcomes in women who underwent elective surgery in the second trimester of gestation because of an adnexal mass. We retrospectively reviewed the hospital records of women who underwent elective surgery for adnexal masses in the second trimester of gestation between 2006 and 2012. The ages of the women ranged between 17 and 33 years. Eight women underwent a laparotomy, and one woman, who aborted on the day of the operation, underwent a laparoscopy. Dermoid cysts, cystadenoma and borderline ovarian tumours were present in four, two and two of the women, respectively. Eight women had no complications after surgery and delivered healthy newborns at term. We concluded that elective surgery on an adnexal mass in the second trimester of gestation is safe for both the mother and the fetus.

BACKGROUND

A cyst called the corpus luteum is required to persistence of pregnancy after the fertilisation of the ovum and may be present as an adnexal mass.¹ Owing to the routine use of ultrasonography instead of traditional pregnancy tests to detect pregnancy, the diagnosis of adnexal masses in the early weeks of gestation has increased. The incidence of adnexal masses detected by ultrasonography during pregnancy was reported to be 1.14%.²

Most of these masses are expected to resolve in the first part of the second trimester of gestation. Masses that are less than 6 cm in diameter, are diagnosed before 16 weeks of gestation and present simple morphology via ultrasonography are more likely to resolve.¹ Suspicions of malignancy or persistence of the mass may lead to surgical intervention, whereas acute complications such as torsion, haemorrhage and rupture of the adnexal mass are also indications for surgery. Although surgery confirmed by pathology allows accurate diagnosis, the pregnant woman and the fetus may be affected by both the surgical procedure and the anaesthesia during surgery. Based on the complications related to surgical intervention in pregnancy, it is important to determine whether surgery is necessary for all pregnant women with adnexal masses.

In the present study, we aimed to evaluate the influence of surgical intervention on gestational and neonatal outcomes in women who had undergone elective surgery in the second trimester of gestation. In contrast to previous studies, the data only reveal the outcomes of elective surgeries performed in the second trimester of gestation.

CASE PRESENTATION

During the study period, there were 3648 deliveries at the clinic and a total of nine pregnancies with adnexal masses were evaluated. The ages of the women ranged between 17 and 33 years. Four of the women were multiparous and had healthy children previously. The remaining women were nulliparous. According to the medical histories, the women had no prior surgery for an adnexal mass. The conceptions occurred spontaneously in all women. The masses of the women were diagnosed by ultrasonography within the first 18 weeks of gestation. None of the women had suffered from abdominal pain. However, patients 1, 5, 8 and 9 were suffering from abdominal swelling. The characteristics of the patients are presented in table 1. Upon ultrasonographic examination, all of the masses were larger than 6 cm in diameter. A nodule with blood flow was observed in patients 3, 5 and 8, who were diagnosed with two serous cystadenomas and one with dermoid cyst. The ultrasonographic features of the masses and the final pathologies are presented in table 2. The levels of Ca125 before surgery were less than 35 IU/mL, except in patients 4 and 5. The gestational ages at diagnosis, at surgery and at delivery ranged between 7 and 18 weeks, 14 and 24 weeks and 37 and 40 weeks, respectively. Four of nine women underwent surgery related to the features of the malignancy and the size of the mass, as determined by ultrasonography. In contrast, for the other five women, only the size of the mass, which may lead to acute complications in pregnancy, was the indication. During the follow-up period between the diagnosis and the surgery, none of the women experienced adverse outcomes.

INVESTIGATIONS

The indications for surgical intervention were given according to physical examination and ultrasonographic findings. Ultrasonographical examination was performed by transvaginally and abdominally with Doppler sonography. The ultrasonographical findings were evaluated by at least two physicians: one perinatologist and one oncologist. The ultrasonographical features that were used to predict malignant transformation were the presence of wall thickening (>3 mm), a solid component, septation thicker than 3 mm, nodules with blood flow and ascites. The pregnant women with masses that met one of the ultrasonographical features listed above and/or with an adnexal mass larger than 6 cm in diameter underwent surgery. Additional imaging techniques were not used for the evaluation of the

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Table 1 Characteristics of the patients

	Age (years)	Gravida (n)	Parity (n)	g.w. at diagnosis (weeks)	g.w. at surgery (weeks)	Type of surgery	Duration of hospital stay (days)	Ca125 (IU/mL)
Patient 1	27	3	1	13	15	LT	4	4
Patient 2	24	1	0	13	17	L/S	4	27
Patient 3	17	1	0	18	23	LT	4	13.9
Patient 4	28	1	0	11	14	LT	4	74
Patient 5	33	2	1	10	14	LT	4	40
Patient 6	26	2	1	22	24	LT	4	29
Patient 7	23	2	1	7	17	LT	4	9
Patient 8	32	1	0	7	14	LT	4	23
Patient 9	33	1	0	12	15	LT	4	20

g.w., Gestational week; LT, laparotomy; L/S, laparoscopy.

masses. Because of maternal CA125 values were found generally under the cut-off value (35 IU/mL) in the second trimester of gestation, Ca 125 was used as a tumour marker. After making the decision to undergo surgery, the women were instructed about the risks and benefits of surgical intervention. The women underwent a physical examination before surgery, and other departments were consulted when necessary.

TREATMENT

Before surgery and a second dose on the third day after surgery, the women were administered 500 mg hydroxyprogesterone by intramuscular injection to avoid abortion or preterm labour. During administration, none of the patients suffered from abdominal pain. The aim of using progesterone was to maintain uterine quiescence during surgical intervention. Early mobilisations were performed instead of unfractionated heparins as thromboembolism prophylaxis. For infection prophylaxis, the women received a first-generation cephalosporin. All of the women underwent surgery under general anaesthesia. The surgeries were performed by laparotomy or laparoscopically. A midline incision was used to access the abdominal cavity during laparotomy. Peritoneal cytology was obtained from either the ascites fluid present or peritoneal washings. Pelvic and abdominal exploration was achieved for all women. Unilateral salpingo-oophorectomy was the surgical process of choice, followed by frozen-section analysis.

OUTCOME AND FOLLOW-UP

During surgery, iatrogenic rupture of the tumour occurred in patient 2. Torsion of the adnexa or spontaneous rupture of the tumour was not observed. The women were discharged on the fourth day after the operation. The final prognoses were reported as benign except for the prognoses of patients 4 and 9. During a postoperative follow-up, one of the women had a wound infection and was treated with antibiotics. Patient 2, who was managed by laparoscopy and had iatrogenic tumour spillage, aborted a 170 g male fetus on the day of surgery. There was no trauma to uterus leading to initiate uterine contractions during surgery. Of the remaining eight women, none experienced abortion, preterm delivery or preterm rupture of membranes. Three of the women delivered by caesarean section, and the other five delivered vaginally. The newborns were healthy. Major or minor congenital anomalies were not observed. The minimum Apgar scores at 1 and 5 min were 7 and 9, respectively (table 3). Patient 4 with mucinous borderline tumour and patient 9 with serous borderline tumour have been followed for 120 and 4 months after delivery, respectively. A restaging surgery was not considered for the patients and no recurrences have occurred during the follow-up period.

DISCUSSION

The persistence of adnexal masses early in the second trimester of gestation arouses anxiety in patients and physicians.

Table 2 Characteristics of the adnexal masses

	Size of the mass (milli meters)	Ultrasonographical features							Pathological finding
		Solid	Cystic	Heterogeneous	Cyst wall >3 mm	Septa >3 mm	Nodule with blood flow	Ascites	
Patient 1	106.6	—	—	+	—	—	—	+	Dermoid cyst
Patient 2	73.6	—	+	—	—	—	—	—	Dermoid cyst
Patient 3	91.6	—	+	—	—	—	+	—	Dermoid cyst
Patient 4	74	—	+	—	—	—	—	—	Mucinous borderline tumour
Patient 5	110	—	—	+	—	—	+	—	Serous cystadenoma
Patient 6	68	—	+	—	—	+	—	—	Corpus luteum
Patient 7	60	—	—	+	—	—	—	—	Dermoid cyst
Patient 8	126	—	+	—	—	—	+	—	Serous cystadenoma
Patient 9	106	—	+	—	+	—	—	—	Serous borderline tumour

Table 3 Characteristics of the newborns

	g.w. at delivery (weeks)	Mode of delivery	Birth weight (grams)	Apgar at first minute	Apgar at fifth minute
Patient 1	37	Vaginal	3000	7	10
Patient 2	–	–	–	–	–
Patient 3	38	Vaginal	2800	9	10
Patient 4	40	Caesarean	3500	7	9
Patient 5	38	Caesarean	3000	8	10
Patient 6	39	Vaginal	3120	9	10
Patient 7	38	Vaginal	3800	9	10
Patient 8	37	Caesarean	2900	8	9
Patient 9	38	Vaginal	3100	9	10

g.w., Gestational week.

Previous studies suggested that most of the adnexal masses diagnosed in pregnancy are functional cysts and will resolve by 16 weeks of gestation.^{2–6} In a study consisting of 2245 pregnant women, the incidence of adnexal masses was 2.94% at the end of first trimester, and the incidence of persistence beyond 16 weeks was 1.2%.⁴ Although whether the persistence of an adnexal mass after the second trimester of gestation requires surgical intervention is still controversial, there is no non-invasive method with the accuracy of pathology for determining the malign potential of adnexal masses. Although adnexal masses ≤ 6 cm in size were reported to be more likely to resolve, Thornton *et al* suggested a size of less than 5 cm.^{7–8} The predictors of persistence are complex morphology and tumour size.⁹ Several studies have investigated the ultrasonographical features that indicate malignancy.^{3–10–11} Bromley *et al*¹⁰ reported that the ultrasonographical characterisation of dermoid cysts, endometriomas and simple cysts was comparable with pathology in 95%, 80% and 71% of patients, respectively. Furthermore, Wheeler *et al*¹¹ demonstrated the comparable accuracy of Doppler sonography and pathology. Septations equal to or thicker than 3 mm in diameter, solid components with blood flow, wall thickening (≥ 3 mm) and the presence of ascites fluid were defined as the ultrasonographical features suggesting malignancy.¹² Our criteria for predicting malignancy by sonography were in keeping with the ultrasonographical features listed above. In our study, the ultrasonographical features established the right diagnosis in two of the four women with dermoid cysts. One of the patients with dermoid cysts was misdiagnosed as having an endometrioma, and another was misdiagnosed as having a malignant tumour because of a nodule with blood flow. In addition, a mass with a nodule with blood flow was diagnosed as a serous cystadenoma after surgery. In women with borderline tumours, the features of malignancy were observed by ultrasonography as wall thickening in only one patient. Doppler sonography was not helpful in detecting borderline tumours.

Although the level of Ca125 was found below the cut-off value during the second trimester of gestation, there is data showing elevated levels of Ca125 up to 73 U/mL during this period.^{13–14} Thus, it is still controversial to use Ca125 as a tumour marker during pregnancy even in the second trimester of gestation.¹³ In the present study, the level of Ca125 was higher than 35 IU/mL in only two women; one with a mucinous borderline tumour and the other with serous cystadenoma and the preoperative Ca125 level was not helpful in estimating the final pathology.

When an adnexal mass is diagnosed during pregnancy, the proper method of management is often unclear. In the literature, there is no sufficient data on adnexal masses managed

conservatively during pregnancy, followed by surgery during the postpartum period. Spontaneously resolved cases after delivery have been reported.¹⁵ As a non-surgical method, the drainage of simple cysts was performed successfully, and the authors confirmed the safety of the procedure.^{15–16}

Laparotomy has been the traditional method of performing surgery on adnexal masses during pregnancy. The feasibility of laparoscopy in the treatment of second-trimester adnexal masses has been reported.^{17–19} In one study, the conversion to laparotomy was reported to be 3%.¹⁷ In the present study, one of the salpingo-oophorectomies was performed laparoscopically at 17 weeks of gestation, and iatrogenic tumour spillage of a dermoid cyst occurred. The patient aborted on the day of surgery. The other factor affecting pregnancy outcome is the indication of surgery when torsion or rupture of the mass is emergent. Patients undergoing emergent surgery were reported as having similar outcomes as patients undergoing elective surgery.⁷ The incidence of ovarian torsion after 20 weeks of gestation is 5.9%.²⁰ Because an elective approach was used in our study, we did not encounter torsion or spontaneous rupture.

Most of the persistent masses in pregnancy are functional and dermoid cysts.⁷ The persistence of the corpus luteum accounts for 17% of all cystic adnexal masses.²¹ Borderline tumours during pregnancy have specific characteristics, with aggressive patterns, and most of these tumours are symptomatic in the second trimester.²² In the final diagnosis, 44.4% of our patients had dermoid cysts. The rate of borderline ovarian tumours was 23%. We presented a patient with a persisting corpus luteum cyst at 24 weeks of gestation. Two women with borderline tumours underwent salpingo-oophorectomy, and in one woman, peritoneal cytology was positive.

The effect of anaesthesia during pregnancy has been previously discussed. Although anaesthesia does not influence the occurrence of congenital anomalies and stillbirths, very low and low birth weight infants are observed.²³

Rizzo did not find any adverse effects during a 7-year follow-up period in patients who had undergone surgery during pregnancy.²⁴ In a group of 67 women, Yuen *et al* evaluated the outcomes of surgery. The researchers reported a patient, who experienced an abortion, but no fetal anomalies were observed.¹⁷ Maternal and fetal outcomes were not adversely affected by either laparoscopy or laparotomy.^{18–19–25} In accordance with the literature, we did not observe any adverse neonatal outcomes.

In conclusion, we have found that elective surgery for adnexal masses in the second trimester of gestation is safe for both the mother and the fetus. To postpone surgical intervention until delivery or the postpartum period may have the risk of requiring emergent surgery in the weeks following gestation

and delay the diagnosis of the malignancy. Further studies are needed to compare the outcomes of elective surgery, emergent surgery and conservative management for the treatment of these masses.

Learning points

- Persistent adnexal masses in pregnancy may be malignant or benign.
- Special attention in investigation of these masses may help to characterise the masses and so management may be done because of these findings.
- Elective surgery in the second trimester of gestation is safe both for the mother and fetus.

Competing interests None.

Patient consent Obtained.

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