Outcomes of Asymptomatic Adnexal Masses in Pregnancy

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Objective:
To investigate the outcome of asymptomatic adnexal masses in pregnancy detected before 16 weeks of gestation.

Methods:
This was a retrospective study on asymptomatic adnexal masses in pregnancy. The outcomes of all the adnexal masses incidentally diagnosed by routine scans before 16 weeks of gestation detected between 1 July 2006 and 30 June 2007 in the Tuen Mun Hospital, Hong Kong were reviewed.

Results:
An adnexal mass was found in 6% (182/2958) pregnancies. Of these, 164 patients had complete follow-up. The majority (77%) of these adnexal masses were simple cysts with a mean diameter of 5 cm or less and 93% (123/132) of them resolved spontaneously during pregnancy. The overall resolution rate for other groups was 56% (20/36). Eight persistent adnexal masses were removed surgically and none of them were malignant. No adnexal masses in the study period caused complications such as torsion or obstructed labour. Among the possible predictive factors for the persistence of the adnexal mass, only its size was a statistically significant factor.

Conclusion:
Our data support conservative management for asymptomatic small simple cysts diagnosed during pregnancy. The need for subsequent follow-up scans in this group during the antenatal period is minimal, due to their benign nature and minimal risk of complications or adverse outcomes.
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Keywords: Adnexal diseases; Ovarian cysts; Pelvic neoplasms; Pregnancy complications

Introduction

The finding of an adnexal mass in pregnancy is quite common and its prevalence is estimated to be about 1 to 2.5%[1-3]. Traditionally, adnexal masses in pregnancy were thought to be associated with adverse outcomes, such as cyst accidents or malignancy. This appeared to be true before the ultrasound era, when most of them were diagnosed by clinical examination as pelvic masses or presented with abdominal pain when cyst complications arose. Thus, surgical removal was usually recommended, so as to prevent adverse outcomes, even though the procedure conferred maternal and fetal morbidities. After extensive use of ultrasound scans in obstetric practice, it transpires that the majority of the adnexal masses in pregnancy were asymptomatic incidental findings. The question whether or not these asymptomatic adnexal masses should be managed actively by excision is a commonly encountered issue. Unlike other studies, our study looked specifically into the outcome of these incidental adnexal masses and the factors that might predict persistence, so as to guide management and prevent unnecessary surgery.

Methods

In our hospital, routine ultrasound scans before 16 weeks of gestation are provided to all patients. Patients found to have adnexal masses had subsequent follow-up scans to look for the persistence as well as any changes in terms of size and sonographic features, until these masses resolved. In general, follow-up scans were arranged: (1) early during the second trimester (around

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weeks 14-16) so that an operation could be performed if indicated, (2) early in the third trimester (around weeks 26-28), and (3) late in the third trimester (around weeks 32-34) to look for any suspicious changes in the masses that might warrant earlier delivery of the baby at an acceptable maturity. This could allow earlier treatment for malignancy. Finally, a post-natal scan (about 6 weeks after delivery) was carried out to assess any need for operation after delivery. There was no lower limit to the size of any adnexal mass to be followed up, so long as it appeared obvious to the sonographers. All the scans were performed by doctors and midwives qualified in obstetric ultrasonography. Records of patients incidentally found to have adnexal masses at the dating scan between 1 July 2006 and 30 June 2007 were reviewed. The sizes and sonographic features of these masses in the initial scan and all subsequent scans were reviewed and recorded. Demographic data of the patients and their pregnancy outcomes were retrieved from the computerised hospital record system. Operative records of those operated on during the antenatal period and the histopathological diagnoses of the adnexal masses were also reviewed.

All the collected data were analysed with the Statistical Package for the Social Sciences (Windows version 13.0; SPSS Inc, Chicago [IL], US). Pearson's Chi-square test was used to assess the goodness-to-fit for categorical variables. Logistic regression analysis was performed to evaluate the influence of different factors on the persistence of the masses. A p value of less than 0.05 was considered statistically significant.

Results

During the 1-year study period, dating scans were performed in 2958 women, 182 (6%) of whom were incidentally found to have adnexal masses without any symptoms. Nine of the 182 patients defaulted subsequent follow-up scans, seven were diagnosed to have silent miscarriage on the initial scan, and two others had termination of their pregnancy for fetal abnormalities. Therefore data for analysis were available from 164 patients who had complete follow-up, seven of whom had bilateral masses giving a total of 171 adnexal masses.

In daily gynaecological practice, the sonographic features of adnexal masses are evaluated for features indicating any risk of malignancy. Simple cysts, especially 5 cm or less, are generally believed to be benign and functional in nature. Based on their sonographic appearances, the asymptomatic adnexal masses in our series were divided into the following groups: simple cyst (uniloculated and echo-free, with mean diameter of 5 cm or less; Figure 1), simple cyst larger than 5 cm, multicystic mass (cystic mass with more than one locule on ultrasound appearance but without any solid area or abnormal echoes inside the mass, irrespective of the size of the mass; Figure 2), and complex mass (with a solid area or abnormal echoes, irrespective of the size or loculation; Figure 3). For the seven patients

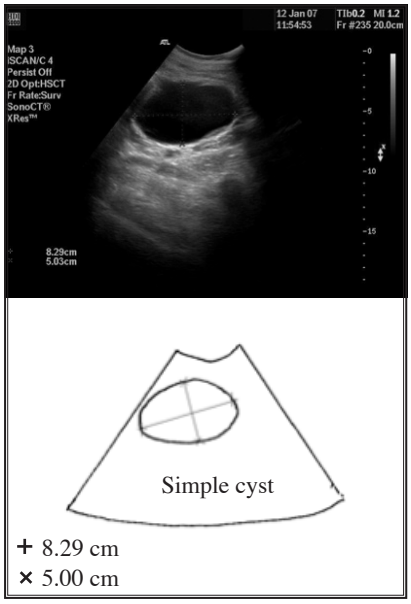

Figure 1. Simple cyst and its line drawing

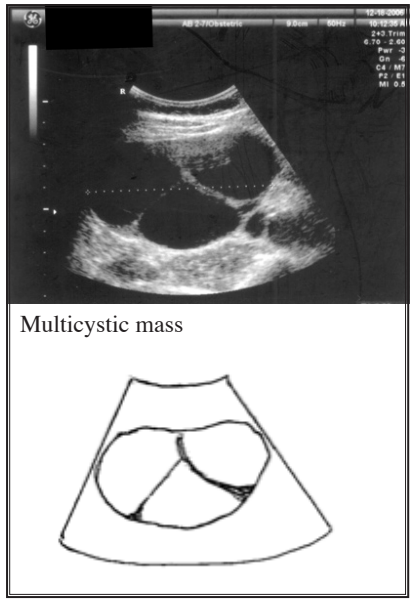

Figure 2: Multicystic mass and its line drawing

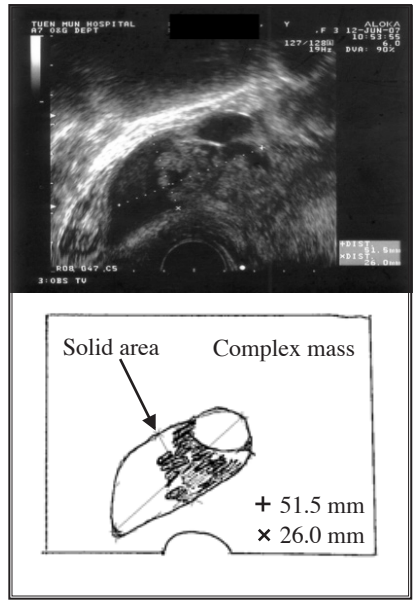

Figure 3: Complex mass and its line drawing

with bilateral adnexal masses, the masses were analysed separately according to their own appearance. Of the 171 adnexal masses, 132 (77%) were simple cysts (≤5 cm). Three masses could not be categorised because data were missing from the records. The remaining 36 masses belonged to the other three groups (Table 1).

The anatomical sites of these masses were not always specified in the records and thus categorisation on this basis was not possible. Colour Doppler examinations are not routinely performed in pregnant patients with adnexal masses, and in our patient series, none underwent colour Doppler studies.

The proportion of patients with known endometriosis was 1% (2/168). Only four (2%) of the patients had undergone ovulation induction or any other assisted reproduction procedure in the current pregnancy.

The mean gestational age at diagnosis and the outcomes of the adnexal masses are summarised in Table 2. Nearly all simple cysts (≤5 cm) resolved, 123 (93%) during pregnancy and one in the postnatal period. Regarding the other three cystic groups (excluding uncategorised masses), 20 out of 36 resolved during pregnancy. Thus, for simple cysts versus the latter cysts, resolution during pregnancy ensued in 93% and 56%, respectively ($p<0.001$). Among the persistent masses, more of the complex masses than simple cysts were surgically removed ($p=0.007$). The difference in the proportion of multicystic masses and complex masses that underwent resolution was not significant (62% vs 55%, $p=0.302$).

The time intervals to resolution of simple cysts (with mean diameter ≤5 cm) are shown in Table 3. Only 45% (59/132) of the cysts resolved by 16 weeks of gestation, but 84% (111/132) had done so by 28 weeks of gestation, and 12 more had resolved by the time the week 32-34 scans were performed. Among the nine persistent simple cysts, five could be followed up by ultrasound after the puerperium, one of which resolved. Two others were diagnosed by ultrasound to be paraovarian cysts, and the remaining two persisted as simple cysts. Histopathological diagnoses of the latter were not made; one patient was lost to follow-up and the other one refused any procedure (Table 2). Postnatal scans were not booked for four patients with residual cysts, due to an administrative arrangement and thus their outcomes after the puerperium were unknown.

Table 1. Categorisation of adnexal masses in pregnancy according to sonographic features in the initial scan (n=171)

Category of adnexal masses	No. (%)
Simple cyst ≤5 cm	132 (77%)
Simple cyst >5 cm	4 (2%)
Multicystic masses	21 (12%)
Complex masses	11 (6%)
Uncategorised	3 (2%)

As outlined in Table 2, six patients underwent elective operations (at 12-24 weeks of gestation) during pregnancy for their adnexal masses, as they were deemed to be at risk of malignancy, although no malignancy was actually found. Regarding the histopathology of the excised masses, three were mature cystic teratomas, two endometriomas and one a corpus luteal cyst. All 10 patients with persistent adnexal masses throughout their pregnancies opted for conservative treatment after counselling. Four patients had Caesarean deliveries for other obstetric indications, at which time the adnexal masses were removed. Postnatal follow-up scans were arranged for the remaining six patients, in three of whom the adnexal masses resolved spontaneously and in the remaining three they were removed surgically and turned out to be benign.

In our series, none of the patients experienced adverse outcome (torsion or rupture of the adnexal masses requiring emergency surgery). None of the persistent masses caused obstructed labour leading to Caesarean delivery.

The size of the adnexal masses, and other sonographic and related features, including loculation and internal echo, and gestational age at diagnosis were evaluated for any possible influence on outcomes. In our series, only the size of the masses was found to be a significant predictor for the persistence ($p<0.001$). Loculation, internal echos, and the time of diagnosis were not significant predictors of the persistence ($p=0.096$,

Table 3. Resolving time of simple cysts of size 5 cm or less

Time of scan (gestational age in weeks)	No. of cyst that had resolved (%)	Cumulative No. of resolved cysts (%)
14-16	59 (45%)	59 (45%)
26-28	52 (39%)	111 (84%)
32-34	12 (9%)	123 (93%)
6 weeks after delivery	1 (1%)	124 (94%)

0.801 and 0.087, respectively).

Discussion

In our series, asymptomatic adnexal masses were found in 6% of all routine scans performed before 16 weeks of gestation, which was much higher than the generally quoted figure of 1 to 2% in other studies[1-4]. This is hardly surprising as some of the latter inferences were from before the ultrasound era, and some studies excluded small simple cysts. In all, 77% of our adnexal masses were simple cysts (mean diameter ≤5 cm), which was consistent with Bernhard et al's series[3], in which 76% of 432 adnexal masses belonged to this group.

It is generally believed that adnexal masses, especially simple cysts found during the first trimester of pregnancy, are functional, and usually resolve spontaneously. Surgical interventions are typically considered when the masses persist beyond 16 weeks of gestation[1]. However, we found that even for the small simple cysts (i.e. size ≤5 cm), only 45% resolved by 16 weeks of gestation. This implies that routine surgical removal of such persistent small simple cysts at 16 weeks of gestation could lead to many unnecessary operations, and thus should not be recommended. For simple cysts larger than 5 cm, our sample size was too small to draw any conclusions.

After excluding simple cysts (≤5 cm) and uncategorised cysts, our 56% overall spontaneous resolution rate during pregnancy was similar to the finding of 69% reported in Bernhard et al's series[3]. However, 17% of the 36 patients in this group underwent surgery during the second trimester, which precluded

Table 2. Outcome of adnexal masses in pregnancy

Category (n)	Mean gestational age at diagnosis (weeks)	Resolved during pregnancy (%)	Operated during pregnancy (%)	Pathology	Persisted throughout pregnancy (%)	Operated at Caesarean section	Resolved at postnatal scan	Operated after puerperium	Pathology
Simple cyst ≤5 cm (132)	11 (4-16)	123 (93%)	0		9 (7%)	0	1*	0	Two paraovarian cysts† Two simple cysts†
Simple cyst >5 cm (4)	12 (10-14)	1 (25%)	1 (25%)	Mature cystic teratoma	2 (50%)	0	0	2	Paraovarian cyst Serous cystadenoma
Multicystic mass (21)	11 (8-15)	13 (62%)	1 (5%)	Corpus luteal cyst	7 (33%)	3	3	1	Simple cyst Paraovarian cyst Endometrioma Follicles
Complex mass (11)	11 (7-14)	6 (55%)	4 (36%)	Two endometrioma Two mature cystic teratoma	1 (9%)	1	0	0	Serous cystadenoma
Uncategorised (3)	13 (13-13)	1 (33%)	2 (67%)	Unknown‡	0	0	0	0	

* Postnatal scan were not booked in 4 cases

† Ultrasound diagnosis only

‡ Operation done in other hospitals, details unknown

evaluation of their natural course.

Management of adnexal masses is sometimes challenging, but could be helpful if we could predict their outcome. Bernhard et al's series showed that their size and sonographic complexity were important predictors of persistence[3]. Our findings also suggested that the larger the size, the masses were less likely to resolve spontaneously, though we could not determine any definite cut-off size for persistence, nor could we show that any sonographic features were important predictors. This was contrary to the general belief that complex sonographic features usually indicate a non-physiological mass that will not resolve spontaneously. One possible reason for our observation may be our relatively small sample size. Further study of such masses is needed to resolve the significance of complex sonographic features as predictors for persistence.

Another concern of adnexal masses in pregnancy is the risk of complications such as torsion and rupture, in which case the patients usually present with abdominal pain. The diagnosis is usually made by clinical examination that reveals a tender pelvic mass. Ultrasound examination may show fluid in pelvis after cyst rupture, whereas torsion is more difficult to diagnose by sonography but a displaced adnexal mass could be a clue[5,6]. Before the wide use of ultrasound in obstetric practice, the liability to torsion was quoted to be 7 to 28%[7-10], which was much higher than the figure of 0.8 to 3.7% reported in more recent studies[3,4,11-13]. This difference may be due to difference in patient populations. In the previous literature, most of the cases had incidental clinically overt (yet asymptomatic) adnexal masses, and others had torsion (presenting with pain), whereas we targeted only the former group. In our series, none of the patients suffered cyst complications requiring emergency surgery. In our series, no adnexal mass gave rise to obstructed labour requiring Caesarean delivery. Since operations may have been offered to patients with relatively bigger masses with the potential to cause obstructed labour, clinician's perspectives on such masses and their clinical judgements may have been biased.

Ovarian cancer is quite rare in pregnancy and a review of several databases in California suggested that it only occurs in 1 in 54 644 deliveries[1]. The prevalence of malignancy in ovarian masses found during pregnancy is estimated to be 2 to 8%[2,13-20]. On reviewing the pathology of such ovarian tumours, most displayed low malignancy potential and were stage-1 cancers[1,17,21,22]. In our series, none of the adnexal masses were found to be malignant. This was probably due to the limited sample size of our series, as the rate of malignancy in ovarian masses during pregnancy has been estimated to be 0.93% by Leiserowitz[1], and 0.8% by Bromley and Benacerraf[23]. Another reason was that the majority of adnexal masses in our patients were simple cysts. Studies have also shown that the risk of malignancy associated with unilocular, echo-free cysts was low (0.73% in pre-menopausal women[24]) and sonographic features like multilocular, complex or solid appearance, with septations, nodules or papillary growth are related to malignancy[2]. One possible limitation in our study is that the final outcomes of some of our patients with persistent adnexal masses were missing (although the number was small), because postnatal scans had not been performed. A larger, prospective study should be performed to more accurately assess the rate of asymptomatic ovarian malignancy during pregnancy.

A major drawback of our study was that about 5% (9/182) of our patients whose initial scans revealed adnexal masses were lost to follow-up in the antenatal period, and their outcome remains unknown. Another drawback was that the histopathological diagnosis was not known in four of our patients with persistent simple cysts. As in other retrospective studies, useful information is commonly missing due to variations in clinical practice and human errors. This omission might have been prevented had we designed a prospective study with a clear protocol.

Unlike pelvic ultrasound scans in day-to-day gynaecology practice, there is no policy to routinely visualise the ovaries in obstetric scans. However in our experience, ovarian masses and especially the cystic ones are easily visualised and picked by sonographers. Thus, it is important to appreciate the benign outcomes of such incidentally found asymptomatic cysts so as not to create unnecessary anxiety in patients. In summary, our data support conservative management of asymptomatic, small

simple cysts diagnosed during pregnancy, because the vast majority of them resolve spontaneously during pregnancy, and even if they persist, the risk of complications is low. The role of follow-up scans during the antenatal period is minimal as they do not predict liability to complications or adverse outcome, and the masses are almost always benign. Our data cannot provide advice on optimal follow-up for patients with other types of adnexal masses in pregnancy. For the latter patients, a larger, prospective study could facilitate the development of possible management strategies.

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