Ovarian cysts in pregnancy. When surgical treatment required and when monitoring preferred?

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Abstract

Introduction: Ovarian cysts occur in 3% of pregnancies. Usually, they do not have clinical symptoms and are found accidentally during the ultrasound screening performed in the 1st trimester of pregnancy. Materials and Methods: Articles were identified through electronic databases; no date or language restrictions were placed; relevant citations were hand searched. The search was conducted using the following terms: ovarian tumors, ovarian cyst, pregnancy, management, and outcome. Discussion: Vast majority is benign; these are functional cysts which resolve in the 2nd trimester. Discrimination of these cysts can be made by color ultrasonography. Ultrasound examination will provide useful information on the size, composition and nature of the tumor, in order to avoid unnecessary surgical interventions during pregnancy. Conclusions: Management of cysts in pregnancy should mainly include a detailed evaluation, through color sonography, based on specific I.O.T.A. criteria, and appropriate treatment should be decided, based on the main purpose of providing healthcare to the pregnant woman and ensuring successful outcome of the pregnancy.

Key words: ovarian cyst, pregnancy, ultrasound evaluation, sonographic features, management, outcome.

Introduction

Finding an ovarian tumor during pregnancy accounts for about 3%\(^1\). Usually, these cysts do not have clinical symptoms and are found accidentally during the ultrasound screening performed in the 1st trimester of pregnancy\(^2\). The most common cyst in pregnancy is the persistent corpus luteum, which in 85% of cases resolves spontaneously in the early of the 2nd trimester\(^3\). Cysts that persist beyond the 16th week of pregnancy are not functional and require further investigation. Rarely these are complicated by pain, torsion, and rupture and create noisy symptoms and bleeding\(^6\). Finally, the incidence of
ovarian cancer in pregnant women aged between 18 and 39 years old, is 1-8 per 100,000 women.

Before the application of ultrasound in clinical practice, diagnosis of ovarian cysts in pregnancy was made by physical examination, especially in cases of pregnant women with symptoms such as abdominal pain or palpable mass. In these cases, immediate surgical intervention was preferred in order to avoid complications. In recent decades, the use of ultrasound changed the management and more information was available to predict the nature of a cyst in pregnancy. The main purpose was to identify and distinguish the cases of pregnant women that require surgical intervention.

Materials and Methods

The purpose of this paper is to provide a complete review for ovarian cysts in pregnancy as a guide for the appropriate management. The authors researched through electronic databases articles concerning this specific subject. No date or language restrictions were placed; relevant citations were hand searched. The search was conducted using the following terms: ovarian tumors, ovarian cyst, pregnancy, management, and outcome.

Discussion

Cysts in pregnancy are divided into benign and malignant. The most common benign ovarian tumors are functional cysts, followed by dermoid cysts, cystadenomas, endometriomas, and finally peritoneal and paraovarian cysts. Malignant ovarian tumors include non-epithelial (germ cell-sex cord) and epithelial tumors (borderline ovarian tumors, invasive ovarian tumors).

Cysts are diagnosed by ultrasound, where high diagnostic accuracy allows discrimination of ovarian tumors in benign and malignant. International Ovarian Tumor Analysis group (I.O.T.A.) described the morphological characteristics and angiogenesis of ovarian tumors (“Simple rules”), to determine their nature.

According to I.O.T.A., the characteristics of benign tumors are the following: 1) unilocular cyst of low echogenicity, 2) presence of solid components (diameter <7mm), 3) acoustic shadowing, 4) multilocular cyst, with smooth surface and a major diameter of <100mm, 5) no blood flow, while the malignant characteristics are: 1) solid tumor with irregular surface, 2) ascites, 3) more than 4 papillary projections, 4) solid multilocular tumor with major diameter >100mm and 5) strong blood flow. If there are one or more benign characteristics, the tumor is defined as benign. If there are one or more malignant characteristics, then the tumor is classified as malignant. If none of the above features exist or if malignant and benign characteristics coexist, then the tumor cannot be classified.

In pregnancy, frequently encountered unilocular cysts of low echogenicity, without vascularization, with a size smaller than 50mm, with smooth surface. They remain asymptomatic and tend to regress during pregnancy. Transvaginal ultrasound color flow imaging, based on specific rules of I.O.T.A. (Simple rules) can help in the diagnosis of a cyst in pregnancy.

Recent studies have reported the usefulness of color ultrasound (Doppler), in the evaluation of cysts in pregnancy. The pulsatility index (PI), and the vascular resistance index (RI) have low values in malignancies, as the vessels of the tumors lack muscular layer. Thereby they present low resistances. Shah et al, have reported high sensitivity and specificity in the detection of malignant tumors with PI <1 (sensitivity 93%, specificity 93%) and RI <0.6 (sensitivity 83%, specificity 93%).
Nevertheless, there is a significant overlap rate between RI and RI in benign and malignant ovarian tumors. Especially in pregnancy, where increased blood flow of the uterus and hemodynamic changes from all three trimesters of the pregnancy affect even more RI and PI values\textsuperscript{21}. Also, three-dimensional color ultrasound provides additional information to distinguish cysts, from the first trimester of the pregnancy, without harming the fetus and hassling the pregnant woman\textsuperscript{23, 24}.

MRI is safely used in the 2nd - 3rd trimester of pregnancy. Its role is mostly assistive (when the ultrasound diagnosis is uncertain or there are suspicious sonographic findings)\textsuperscript{25}. It can accurately distinguish the content of the tumor (liquid or solid), displays the exact origin of pelvic formations and controls in detail the existence of vascularization\textsuperscript{26-29}.

Correlation between tumor markers and pregnancy is unclear. Ca–125 is most frequently used. It is a glycoprotein that increases in primary ovarian carcinoma, as well as in benign conditions such as endometriosis, uterine fibroids, pelvic inflammation, menstruation and pregnancy\textsuperscript{30-32}. Particularly during the 1st and 3rd trimester, increased amounts of Ca–125 are produced from amnion and decidua. This marker is estimated mainly when its value is greater than 100IU/ml, while its main use is disease progression or response to therapy\textsuperscript{33, 34}.

**Management of cysts in pregnancy**

The decision whether a cyst in pregnancy will be managed conservatively or surgically depends on the sonographic features and the size of the cyst\textsuperscript{35}. Initially, conservative management of cysts is recommended, with regular monitoring, as 71% of them will be absorbed\textsuperscript{36, 37}. According to the Royal College of Obstetricians and Gynecologists, simple, unilateral, unilocular ovarian cysts <5cm have a low risk of malignancy and can be treated conservatively\textsuperscript{38}. Also, regular ultrasound examination assists early detection of progressive changes in the size and morphology of tumors\textsuperscript{39}. In asymptomatic tumors, without signs of malignancy, which are detected in the 1st trimester, re-examination is recommended at 16 weeks of gestation. If this does not persist and remains stable, ultrasound re-examination is recommended at 6-8 weeks postpartum\textsuperscript{13}. In case that the cyst persists or increases in size, after 16 weeks of gestation, and there are equivocal or suspicious sonographic findings for malignancy, MRI in the lower abdomen and surgical intervention are recommended. Moreover, surgical intervention is required when a complication occurs, such as rupture, torsion, and bleeding (Figure 1)\textsuperscript{13, 40-42}.

**Table 1: Sonographic features of cysts in pregnancy**

<table>
<thead>
<tr>
<th>Type of cyst</th>
<th>Sonographic features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional cyst</td>
<td>Thin wall – smooth surface, without echogenicity, without vascularization</td>
</tr>
<tr>
<td>Dermoid cyst</td>
<td>Mixed echogenicity, with linear echogenic reflections (hair), homogeneous or heterogeneous echostructure, with acoustic shadowing or without vascularization</td>
</tr>
<tr>
<td>Endometrioid cyst</td>
<td>Mixed echogenicity, (ground glass appearance) homogeneous echostructure, without vascularization or unilocular solid formation with 1 papillary lesion, without vascularization (atypical endometrioma) or multiple lesions with smooth surface and vascularization (decidualized endometrioma)</td>
</tr>
<tr>
<td>Cystadenoma (Serous or mucinous)</td>
<td>Unilocular or multilocular cyst with serous or mucinous content, smooth surface and without vascularization.</td>
</tr>
<tr>
<td>Epithelial borderline ovarian tumors</td>
<td>Unilocular or multilocular solid formations with wall abnormalities and/or solid elements with vascularization</td>
</tr>
<tr>
<td>Invasive ovarian tumors</td>
<td>Solid formations, heterogeneous echostructure, and irregular surface with rich vascularization</td>
</tr>
</tbody>
</table>

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Figure 1. Management of cyst in pregnancy
between 16 and 23 weeks of gestation, is considered ideal for surgical intervention, since the risk for spontaneous abortion of 1st trimester and preterm delivery of 3rd trimester is reduced.\textsuperscript{43,44}

**Conclusions**

Cysts occur in 3% of pregnancies. Vast majority is benign; these are functional cysts which resolve in the 2nd trimester. Discrimination of these cysts can be made by color ultrasonography. Ultrasound examination will provide useful information on the size, composition and nature of the tumor, in order to avoid unnecessary surgical interventions during pregnancy. Features, such as tumor size > 5 cm, heterogeneous echostructure, irregular surface, presence of wall abnormalities, presence of solid components with vascularization, raise strong suspicion of malignancy.

Color three-dimensional ultrasonography significantly increases diagnostic accuracy, while MRI has a complementary-supportive role, especially when there are suspicious sonographic findings. Tumor markers are not reliable in investigating cysts in pregnancy, due to their low specificity.

Cysts in pregnancy should be evaluated in detail, through color sonography, based on specific I.O.T.A. criteria, and appropriate treatment should be decided, based on the main purpose of providing healthcare to the pregnant woman and ensuring successful outcome of the pregnancy.

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