

## Clinical review on the differential diagnosis of benign and malignant ovarian cancer

Differential diagnosis of benign and malignant ovarian cancer

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### Abstract

The problem of diagnosing and treating tumors and tumor-like formations of the ovaries is complex and extremely urgent not only in connection with the increase in the frequency of the disease but also the severity of the disorders of the reproductive and other body systems caused by them. Our study included 21 patients' data who admitted to the Department of Gynaecology, 1st Republic Scientific Cancer Centre, Tashkent, Uzbekistan. All patients were diagnosed with different types of ovarian mass and had undergone US imaging. The identification of a unilocular solid cyst had a positive predictive value for malignancy of 37.1%, while the identification of a multilocular solid cyst had a positive predictive value for malignancy of 43.0% from IOTA framework. Mucinous cystadenocarcinoma was commonly unilateral and involves the presence of irregular thick septa or solid papillary projections which are usually detected within cysts. Using the categories of unilocular cysts, unilocular solid cysts, multilocular cysts, multilocular solid cysts, and solid tumors, it is possible to recognize typical cases of each category. In order to create an easy and simple classification facilitating the differentiation of benign and malignant masses, familiarity with the pattern recognition approach to US is required.

### Keywords

Ultrasound; Cancer; Endometrioma; Benign; Malignant

DOI: 10.4328/ACAM.20197 Received: 2020-05-02 Accepted: 2020-06-01 Published Online: 2020-06-14 Printed: 2020-06-30 Ann Clin Anal Med 2020;11(Suppl 3): S306-308

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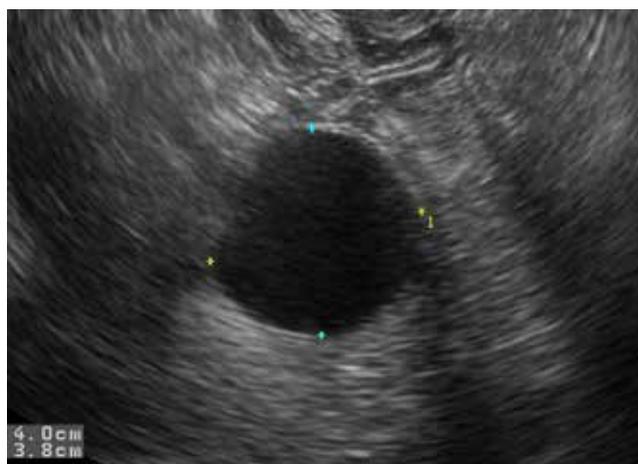
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## Introduction

Ultrasound imaging remains the study of choice in the initial evaluation of suspect adnexal masses because it is relatively inexpensive, noninvasive, and widely available. Early and correct diagnosis of ovarian masses has a great impact on the ultimate survival. The present study was done to know the role of color Doppler studies in the characterization of ovarian masses and to evaluate its efficacy in diagnosis and differentiation of these neoplasms when used along with grayscale (B-mode) ultrasonography (US). Transabdominal US, endovaginal US, or both should be performed for the evaluation of adnexal masses. Endovaginal US has markedly improved resolution for uterine and adnexal imaging and is essential for imaging adnexal masses the nature of which is not apparent with transabdominal US [1]. Morphologic features including thick, irregular walls and septa, papillary projections, and solid, moderately echogenic loculi have been described as suggestive of malignant tumor. Color Doppler US of ovarian masses helps identify vascularized tissue and can assist in differentiating solid tumor tissue from nonvascularized structures [2,3]. Benign lesions tend to initiate new tumor blood vessel formation peripherally from preexisting host vessels, whereas malignant tumors tend to initiate new tumor blood vessel formation centrally. Two indexes have been used in analyzing Doppler waveforms: the pulsatility index and the resistive index. Both increase with increasing distal vascular resistance, and the two indexes have a high correlation. However, resistive indexes less than 0.4–0.8 and pulsatility indexes less than 1.0 are generally considered to be suspicious for malignancy. The use of a combination of morphologic analysis with the endovaginal US and pulsed Doppler waveform analysis with color Doppler US may help overcome problems [4,5]. The various categories of ovarian masses according to the US features defined in the IOTA (Internet of Things Agent) framework are reviewed in this article.

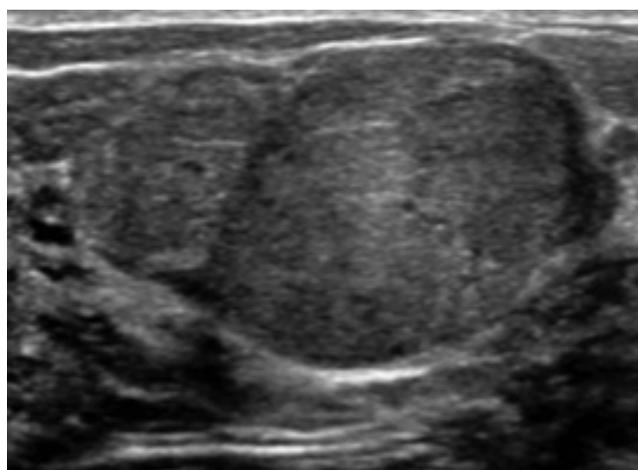
In this study, we reviewed data of 21 patients who admitted to the Department of Gynecology, 1st Republic Scientific Cancer Centre, Tashkent, Uzbekistan. All patients were diagnosed with different types of ovarian mass and had undergone US imaging. Most unilocular cysts such as follicular cyst and benign serous tumors can demonstrate anechoic features (Figure 1). Since blood clots, fat, and sebaceous materials can be occasionally mistaken for solid components within a cyst, it is necessary to understand the typical US features of a “complex” cyst, which is defined as cyst containing any kind of nonviable components. Hemorrhagic corpus luteal cyst can be caused by bleeding to corpus luteum. In the acute stage, a hemorrhagic cyst may contain clotted blood, which manifests in US as intensely echogenic, avascular, homogeneous, or heterogeneous material. It can occasionally appear to have a bizarre contour compared to the lobulated contour found in malignancies (Figure 2). Over time, the clot may retract and liquefy, resulting in an undulating and concave surface. In a later stage, resolved clots with fibrin strands result in a pattern that referred to with a variety of terms, including “cobweb,” “honeycomb,” “reticular,” “lacy,” “fishnet,” and “sponge” (Figure 3). Endometrioma occurs in the ovary where ectopic endometrial tissue is implanted [6, 7]. The characteristic US features of endometrioma are homogeneously diffuse low-level echoes in the cyst, compromising the so-



**Figure 1.** Transvaginal ultrasonography shows a well-defined anechoic mass without a solid component



**Figure 2.** Transvaginal ultrasonography (US) shows a rectangular hypoechoic lesion in the cystic mass



**Figure 3.** Transvaginal ultrasonography shows a round complex echogenic ovarian mass

called ground-glass appearance, which is indicative of chronic repetitive hemorrhages within the cyst. However, less than 15% of endometrioma have atypical findings, such as fluid-fluid level, hyperechoic mural irregularity, heterogeneity, or calcification. In addition, endometrioma in postmenopausal patients are less likely to exhibit the typical “ground-glass” pattern of echogenicity, and malignant transformations to endometrioid

or clear cell carcinoma have been reported in older patients. Mature cystic teratoma often referred to as dermoid or dermoidcyst, typically shows focal high echogenic nodules, heterogeneous internal echoes in the cyst with acoustic shadows, and multiple hyperechoic fine lines and dots, which are due to reflection by clumps of hair, sebum, or fat component within the mass. The hyperechoic area is not usually as intensely echogenic as calcification and may be confused with the echo of adjacent bowel gas.

### Unilocular Solid Cyst

Most serious cystadenocarcinoma, endometrioid adenocarcinoma, clear cell carcinoma, serous borderline malignancies, and cystadenofibroma are categorized as unilocular solid cyst [8]. According to a study using IOTA (Internet of Things Agent) framework, the identification of a unilocular solid cyst has a positive predictive value for malignancy of 37.1%. Single or multiple papillary projections of the cystic wall can exist as the solid component of serous cystadenocarcinoma or endometrioid adenocarcinoma, where the vascular flow can be detected. Clear cell carcinoma usually appears as a large cystic mass with a smooth marginated solid component. Tubo-ovarian abscess is manifested as complex multilocular cyst with thick walls and thick septa, filled with homogeneously diffuse low echoic materials. As the disease progresses, the walls and septa can be changed to be thicker with more increased vascularity.

### Conclusion

In order to create an easy and simple classification facilitating the differentiation of benign and malignant masses, familiarity with the pattern recognition approach to US is required. Using the categories of unilocular cyst, unilocular solid cyst, multilocular cyst, multilocular solid cyst, and solid tumor, it is possible to recognize typical cases of each category. These results lead to confident and specific diagnoses of hemorrhagic corpus luteal cyst, cystic teratoma, endometrioma, tubo-ovarian abscess, benign or malignant epithelial tumor, sex cord-stromal tumor, rare malignant germ cell tumor, and metastatic tumor.

### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

**Funding:** None

### Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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### How to cite this article:

Munajat Ismailova, Abdurashid Nigmatjonov, Zilola Usmanova. Clinical review on the differential diagnosis of benign and malignant ovarian cancer. *Ann Clin Anal Med* 2020;11(Suppl 3): S306-308