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Review Article

**A SYSTEMATIC REVIEW: ROLE OF ULTRASOUND IN  
EVALUATION OF ADNEXAL MASSES**Dr. Muhammad Umer Gul<sup>1</sup>, Dr. Abdullah Sarfraz Cheema<sup>2</sup>, Dr. Mubashra Shamshad<sup>3</sup>

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**Abstract:**

**Aim:** Pelvic ultrasound is commonly used as part of the routine gynecologic exams which resulting in diagnosis of adnexal masses, the majority of which are functional or benign. However, due to the possible complications involving benign adnexal cysts (i.e, adnexal torsion, pelvic pain) and the utmost importance of early diagnosis and treatment of ovarian cancer, the correct ultrasound diagnosis of adnexal masses is essential in clinical practice. This review will describe the typical ultrasound appearance of the common physiologic, benign, and malignant adnexal masses with the aim of aiding the clinician to reach the correct diagnosis.

**Methods:** In this study digital database base including PubMed, EMBASE and Google scholars were searched. The survey was carried out using Key word such as “benign “, malignant “adnexal masses” , “ovarian cancer “,adnexal pathology “ neoplasms “diagnosis” risk assessment” ultrasonography” variously associated together.

**Conclusion:** ultrasound is more accurate in discriminating malignancies from benign tumors. The best use for this technique seems in giving further preoperative information about masses with uncertain sonographic characteristics, allowing better timing and tailoring of surgery.

**Key words:** Adnexal benign & malignant masses, neoplasm, adnexal neoplasm, ovarian cancer, ultrasonography

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**INTRODUCTION:**

Pelvic ultrasonography to visualize the adnexa and the uterus is commonly performed in symptomatic and asymptomatic women of reproductive and menopausal age. Although pelvic ultrasound is highly sensitive in detecting adnexal masses, its specificity in detecting malignancy is lower. In addition, the differentiation between functional ovarian masses that will resolve over time and nonfunctional masses has tremendous implications for patients counseling and management. Other types of adnexal cysts (such as endometrioma, mature cystic teratoma, and paraovarian cysts) are also important to diagnose correctly since they may affect patient's fertility, may be associated with significant pelvic disease, or put the patient at risk for ovarian torsion. (1) Thus, the correct use of pelvic ultrasonography has become an integral part of the gynecologic evaluation and exam. The main ultrasound findings for the most common adnexal

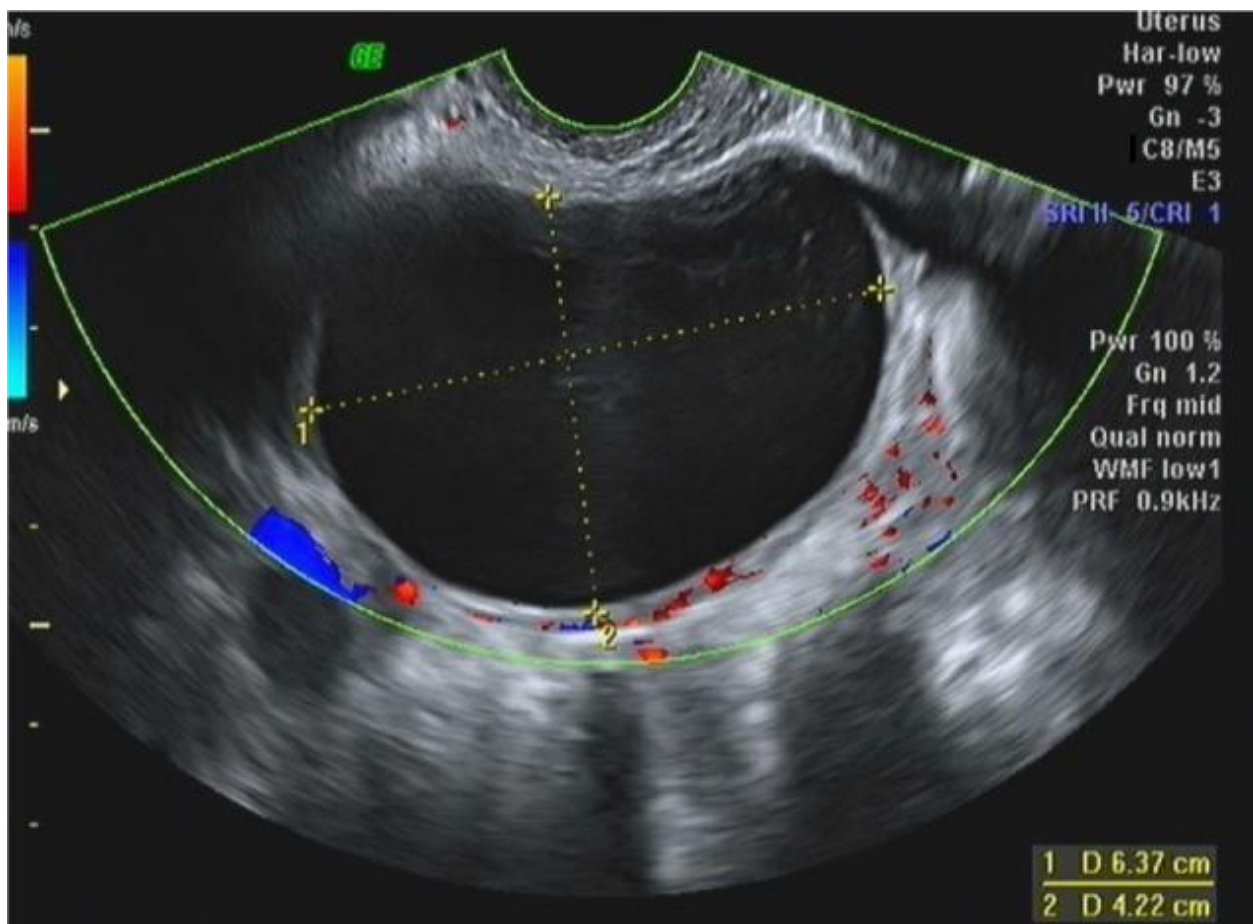
masses, with an emphasis on the practical diagnosis of different cyst types.

**US evaluation of adnexal masses:**

An adnexal mass (mass of the ovary, fallopian tube, or surrounding connective tissues) is a common gynecologic problem. Pelvic ultrasound is typically the first-line imaging study used to characterize an adnexal mass.

**Simple cyst:**

A simple cyst typically is round or oval, anechoic, and has smooth, thin walls. It contains no solid component or septation (with rare exceptions), and no internal flow is visible on color Doppler imaging. Levine and colleagues observed that simple adnexal cysts as large as 10 cm carry a risk of malignancy of less than 1%, regardless of the age of the patient. (2) (figure 1)



**Figure 1:** Transvaginal ultrasound in a 25-year-old woman.

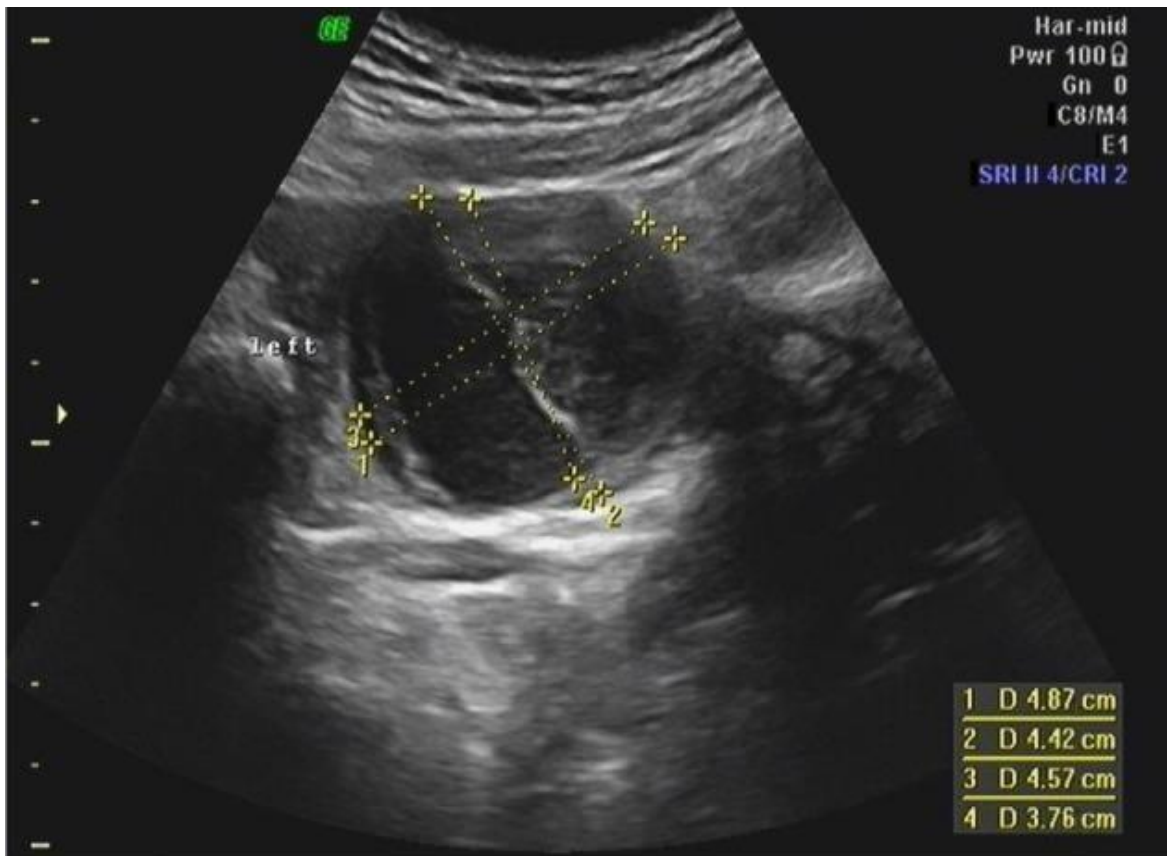
**Notes:** This simple cyst measuring 64 mm by 42 mm was seen on transvaginal ultrasound in a 25-year-old woman complaining of lower abdominal pain. She was followed for several months with cyst persistence and therefore underwent laparoscopic cystectomy. On laparoscopy, a smooth walled cyst containing clear citrine fluid was seen. Pathology revealed a benign cystadenoma.

#### Hemorrhagic cyst:

Hemorrhagic ovarian cyst (HOC) is an adnexal mass formed because of occurrence of bleeding into a follicular or corpus luteum cyst (1). Hemorrhagic cysts

are commonly seen in clinical practice because hemorrhage into a cyst is usually painful, triggering the patient to consult her physician. They can present with variable clinical symptoms and signs ranging from no symptoms up to acute abdomen.

HOCs are commonly detected by gray-scale ultrasound, but they are often misdiagnosed due to their variable sonographic appearance; mimicking other organic adnexal masses. Most of HOCs are functional, few of them can be neoplastic but they are universally benign (3).



**Figure 2:** Transabdominal ultrasound in a 16-year-old adolescent.

**Notes:** A hemorrhagic cyst consistent with a corpus luteum cyst diagnosed on transabdominal ultrasound in a 16-year-old adolescent who presented with acute abdominal pain. A hypoechogenic cyst with an echogenic structure representing the blood clot is observed. In addition, the delicate “cobweb” is seen.

#### Benign cystic teratoma (dermoid cyst):

Benign cystic teratoma, also called dermoid cysts, are the most common type of germ cell tumors, most often diagnosed in adolescents and reproductive-age women. Because these cysts contain sebaceous material and sometimes hair, their appearance on grayscale ultrasound is of a hyperechoic mass producing an acoustic shadow, ie, gradual attenuation of the sound and obscuring of the structures beyond the

cyst (figure 3). Occasionally, these cysts contain mostly sebaceous fluid, seen on ultrasound as a hypoechoic cyst with echogenic wall components which represent a mixture of hair and more solid sebaceous material (Figure 4). In addition, in those cases where the hair component of the cyst disperses into the cystic fluid, the ultrasound picture is of fine hyperechoic lines called “dermoid mesh”.(4) When the cyst contains bone or teeth, these may also appear as a

solid hyperechoic part of the cyst. Despite the diverse appearance of dermoid cysts on ultrasound, their diagnosis is often straightforward, reaching a sensitivity of 99%. (5) Nevertheless, dermoid cysts are sometimes difficult to differentiate on ultrasound from hemorrhagic cysts and endometriomas. In those cases, computed tomography or magnetic resonance imaging may help reach an accurate diagnosis. (6)

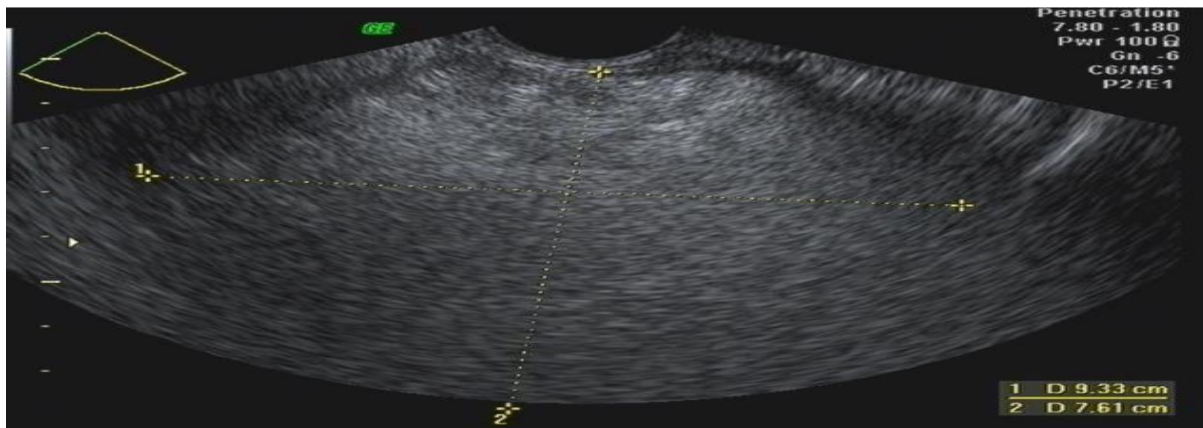


Figure 3: Transvaginal ultrasound in a 70-year-old woman.

**Notes:** A 90 mm dermoid cyst diagnosed on routine transvaginal ultrasound in a 70-year-old woman. The cyst contains mostly echoic material and produces a noticeable acoustic shadow with attenuation of the sound beyond the cyst.

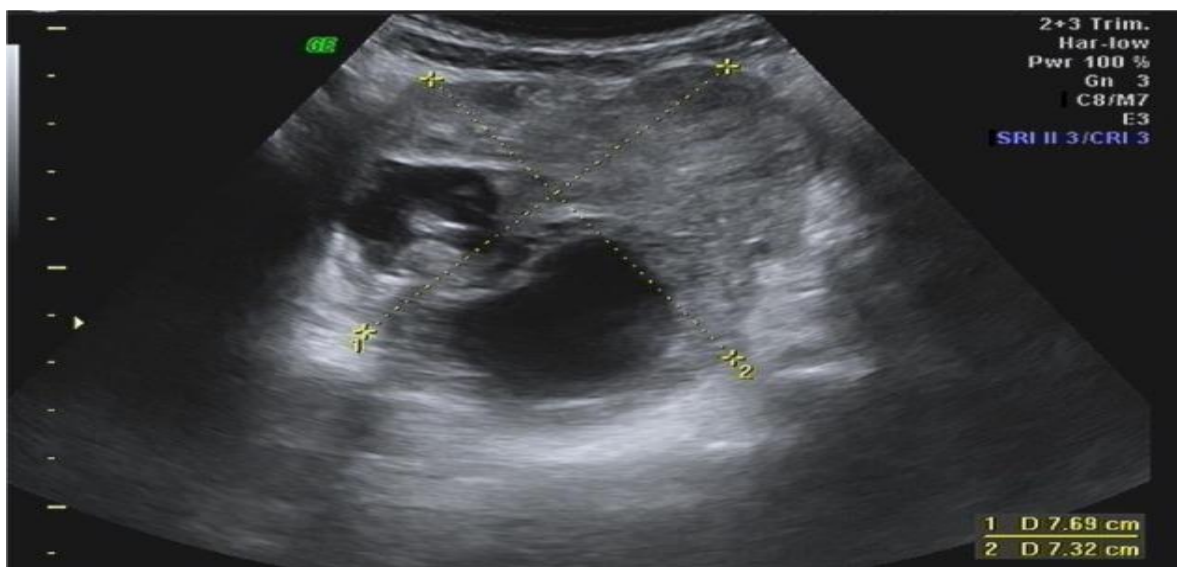


Figure 4 : Transabdominal scan in a 9-year-old girl.

**Notes:** An enlarged ovary was seen on transabdominal scan in a 9-year-old girl who presented with abdominal pain. The ovary contained two cystic areas, one with an echogenic structure. In addition, the stroma of the ovary appears edematous and the normal follicular structure is lost. On laparoscopy, torsion of the ovary involving a large dermoid cyst was diagnosed.

#### Hydrosalpinx:

Hydrosalpinx represents fluid trapped in a distended fallopian tube with distal occlusion, and occurs in the

setting of previous pelvic inflammatory disease. The appearance on grayscale ultrasound is of a tubular and elongated cystic mass with incomplete septations or indentations along its walls (“waist sign” or “cogwheel”).(6) In order to fully appreciate the tubular structure of the cyst, the ultrasound probe may be turned by a 90° angle, and a seemingly simple cyst will appear to be tubular (Figure 5). In the chronic stage, small mural nodules may be noted, resembling “beads on string”. Those typical pattern are highly suspicious for the diagnosis of hydrosalpinx. (7,8)



Figure 5 : Transvaginal ultrasound in a 28-year-old nulligravida.

**Notes:** A tubular hypoechoic mass with indentations along its walls consistent with a hydrosalpinx was seen on transvaginal ultrasound in a 28-year-old nulligravida with known tubal occlusion on hysterosalpingogram. Laparoscopy confirmed these findings along with severe pelvic adhesions.

#### Paratubal cyst:

Paratubal cysts, also called paraovarian cysts, typically appear on grayscale ultrasound as unilocular, thin-walled cysts with smooth margins and anechoic contents. In order to differentiate these cysts from ovarian simple cysts it is necessary to visualize the ipsilateral ovary separately from the cyst.(9) Often, these cysts grow to a large size before their diagnosis,

and their side localization (ie, right or left) may be difficult. Very rarely, a borderline or overt malignancy may be found in a paratubal cyst, usually in the older reproductive age or perimenopausal age groups.(10)

**Endometrioma** Those “chocolate fluid” filled cysts represent the involvement of the ovaries in the process of endometriosis. Endometriomas have a typical appearance on grayscale ultrasound, as uni- or multiloculated cysts containing diffuse low-level homogenous echoes, also known as “ground glass” appearance (Figure 6).(11) However, this typical appearance is present in about 85%–90% of surgically confirmed cases, while, in the remaining, a nontypical appearance is present with cyst wall projections (thought to represent blood clots), heterogeneous

appearance of the internal echoes, or even a solid appearance (possibly in chronic ovarian endometriomas).(6) Thus, a differential diagnosis may exist with hemorrhagic cysts, mucinous cystadenoma, or even malignancy. Use of Doppler flow does not

increase the diagnostic accuracy of grayscale ultrasound for the diagnosis endometrioma, since resistance indices are in the normal range, and color Doppler reveals flow only in the cyst's wall.(12)



Figure 7: Ovarian cyst observed on transvaginal ultrasound in a 25-year-old woman.

**Notes:** A 58×44 mm ovarian cyst was observed on transvaginal ultrasound in a 25-year-old woman who presented with pelvic pain. The “ground glass” typical appearance of endometrioma is noticed. Laparoscopy confirmed the diagnosis.

#### **Tubo-ovarian abscess (TOA)**

TOAs result from a severe pelvic inflammatory disease and represent a breakdown of the adnexal structures (ie, ovary and fallopian tube) by the infection and inflammation process. The ultrasound appearance of TOAs is variable and depends on the duration of the infection. Over time, as the abscess “matures”, part of its content may appear cystic.(13) At times, an adjacent pyosalpinx may be observed. The clinical presentation is the key to the correct diagnosis of TOA.

#### **Peritoneal inclusion cysts:**

Inclusion cysts, also called pseudocysts, commonly occur in the setting of previous pelvic surgeries, previous pelvic inflammatory disease, or advanced stage endometriosis. The pseudocysts represent fluid trapped between peritoneal adhesions, and therefore have no actual cyst wall. Thus, the shape of the pseudocyst appears irregular as it is defined by the surrounding structures and adhesions.(14) Often, the ovary is visualized separately from the cyst but in close proximity to it. It is clinically important to suspect the presence of pseudocysts in the appropriate clinical setting since further surgical intervention is unnecessary and may involve injury to nearby pelvic structures due to pelvic adhesive disease.

#### **Adnexal torsion:**

Adnexal torsion occurs mostly in premenarchal and reproductive-age women, and may involve an adnexal cyst (either ovarian or paratubal) or an otherwise normal adnexa (also called “torsion of normal adnexa”). In the clinical setting of acute pelvic pain often accompanied by nausea and vomiting, and tenderness on abdominal and adnexal palpation, the ultrasound characteristics of adnexal torsion are helpful in reaching the presumed diagnosis of torsion. Those characteristics include either an enlarged ovary with peripheral follicles (thought to represent the stromal edema) or enlarged ovary with a seemingly

solid appearance (figure 4 and 7) (5). The latter picture is more typical of a longer ischemic process. (15) Often, free pelvic fluid is noted near the adnexa. When an adnexal cyst is the cause of torsion, it is easily visualized as well and its nature may be determined (ie, dermoid cyst, paratubal cyst, or a hemorrhagic cyst). Use of Doppler flow may be misleading in the diagnosis of the torsion due to high false-negative rate – a torsed adnexa may still be seen as having normal Doppler flows due to the ovary’s double blood supply (ie, from the ovarian vessels and the utero-ovarian vessels).

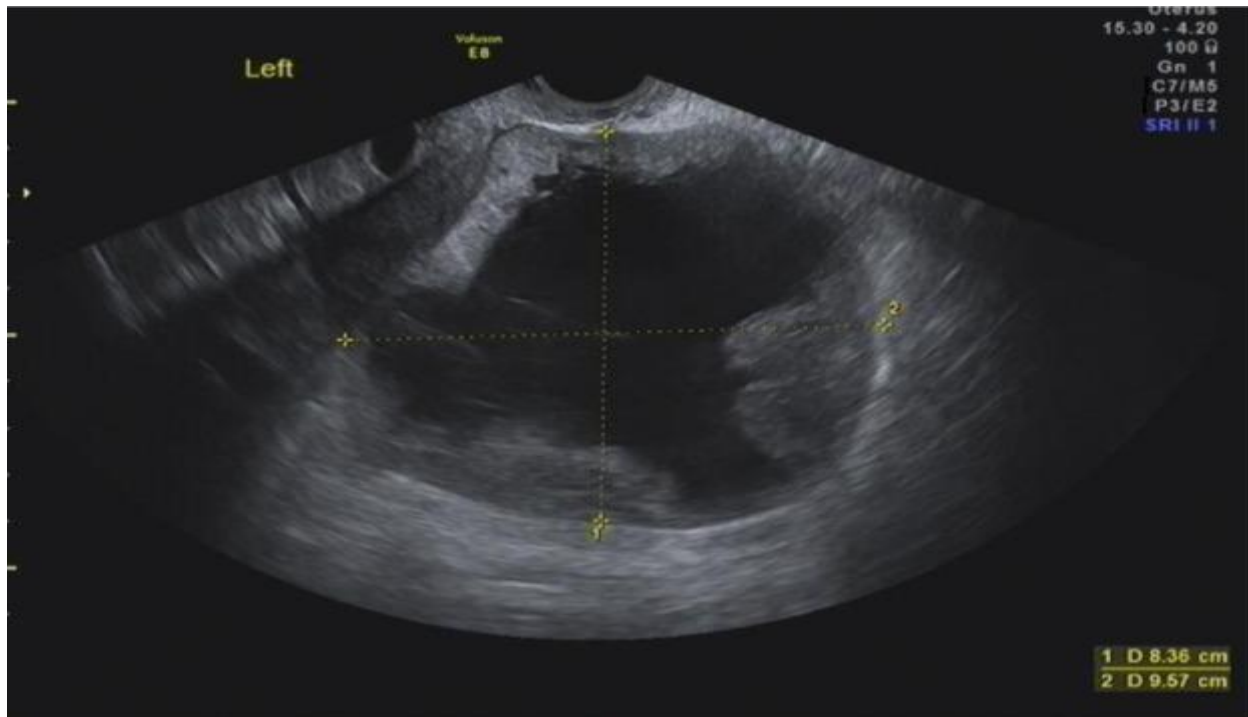


Figure 7: Transabdominal ultrasound scan in an 8-year-old girl with abdominal pain.

**Notes:** An enlarged ovary with loss of follicular structure was seen in an 8-year-old girl who presented with pelvic pain and vomiting. Laparoscopy confirmed torsion of the adnexa.

Identification of malignant masses and risk stratification

Although cysts containing malignant neoplasms of epithelial origin are rare, their timely diagnosis is of the utmost importance since early diagnosis and treatment of ovarian cancer is the most important

factor in determining survival. Ultrasound features suggestive of epithelial malignancy include thick septations (>2–3 mm in width), solid components, and cyst wall thickening (Figures 8 and 9). The solid areas (or hyperechoic areas) may vary in size, from small nodules or papillations to larger areas. The diameter of the mass appears to be less predictive of malignancy than the features described above. Moreover, malignancies have been described even in relatively small cysts of 3–4 cm in diameter. (18)

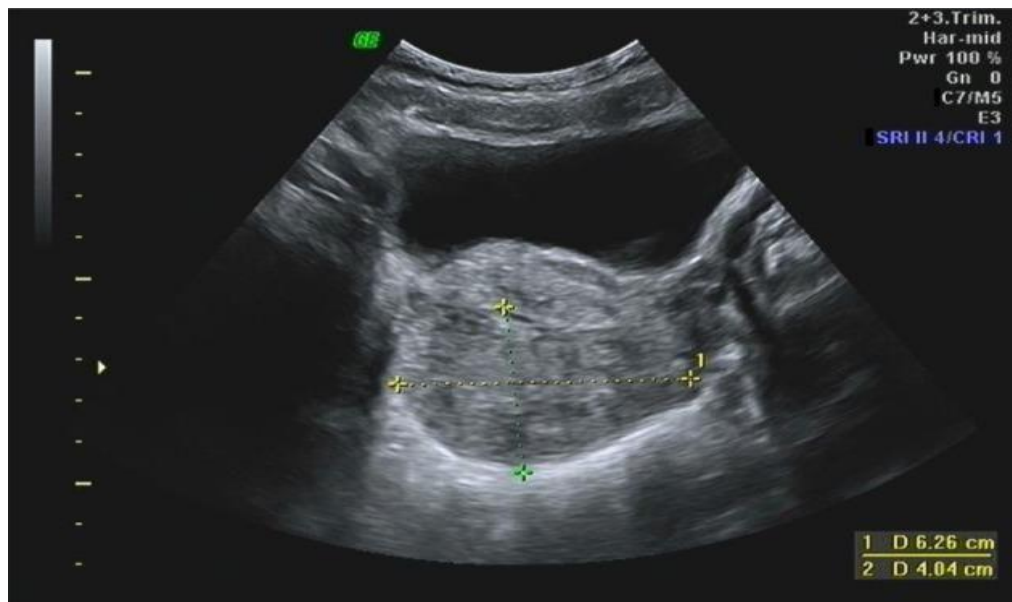


Figure 8 : Transvaginal ultrasound in a 64-year-old woman with pelvic mass.

**Notes:** A pelvic mass measuring 83×95 mm and containing septations and papillations was seen in a 64-year-old woman. Surgery revealed an adenocarcinoma of the ovary.



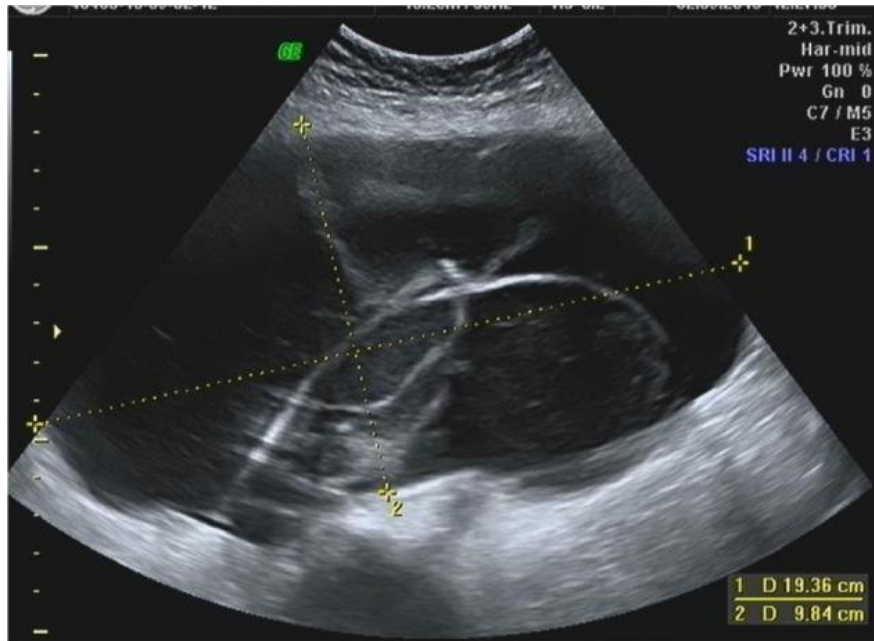


Figure 9 : Transabdominal ultrasound scan in a 41-year-old woman.

Notes: This large cyst in a 41-year-old woman contains thin septations without increased Doppler blood flow. Surgery revealed a benign mucinous cystadenoma. The addition of Doppler flow measurements to the gray-scale parameters described above may provide additional information in suspicious cases, and has been thought to increase the sensitivity, specificity, and positive predictive value of ultrasound in diagnosing ovarian malignancy. This modality is used to detect abnormal blood vessels which arise from the neovascularization process induced by the malignant lesion. These blood vessels are characterized by abnormal blood flow patterns, typically low resistance to flow, which translates to abnormal pulsed Doppler parameters. However, despite initial interest in this feature, studies have failed to show a significant improvement in detection of malignancy over traditional morphological assessment. The best approach to the correct diagnosis of malignancy now appears to be a combined assessment of gray scale morphologic features and color Doppler imaging. For example, color Doppler may reveal flow within solid areas of the mass, raising suspicion for malignancy. Nevertheless, there is probably a significant overlap between benign and malignant masses in terms of their Doppler flow features. (19)

Three-dimensional ultrasound and three-dimensional power Doppler are relatively new technologies used to assess adnexal masses. Three-dimensional ultrasound

visualizes the adnexa in three planes (coronal, sagittal, and frontal) and allows for reconstruction and further analysis of the volumes acquired and stored, while three-dimensional power Doppler allows for assessment of the vascularity of the mass in all three planes. Findings on three-dimensional ultrasound and power Doppler which have been associated with malignancy include vascular flow in the center of the mass ("central flow"), blood flow within septations and excrescences, and a complex appearance of the vascular architecture. Although current studies have not shown a definite advantage of the three-dimensional power Doppler over two-dimensional power Doppler in accurately diagnosing ovarian malignancy, future studies may help define the role of these technologies in the workup of adnexal masses.

#### Systematic Review:

1. In 2017 a study was made by Vincenzo de Sanctis on asymptomatic adnexal cyst. The aim of this study was to evaluate Paraovarian or paratubal cysts (PTCs) constitute about 10% of adnexal masses. Although they are not uncommon, they rarely cause symptoms and are usually incidentally found. The symptoms occur when they grow excessively, or in case of hemorrhage, rupture or torsion. . US imaging is currently considered as the first-line imaging technique for discriminating between

- benign and malignant adnexal masses. However, this technique is highly dependent on the expertise of the examiner
2. A study was made by Noam smorgick on assessment of adnexal mases using ultrasound in 2014 they conclude that Use of grayscale ultrasound combined with Doppler measurements when necessary allows the experienced sonographer to reliably diagnose functional, benign, and malignant adnexal masses. The information obtained from the pelvic ultrasound, combined with patient's history and gynecologic exam, will guide recommendations from treatment, primarily the decision for conservative follow-up versus surgery.
  3. In 2014 a study was made by HakkıSencerSimsek. The aim of this study was to evaluate predictive role of risk of malignancy index in discriminating between benign and malignant adnexal masses preoperatively. This retrospective study was conducted with a total of 569 patients with adnexal masses/ovarian cysts managed surgically at clinic between January 2006 and January 2012. Pathology reports of the 569 patients 245 (43.1%) were malignant, 316 (55.5%) were benign and 8 (1.4%) were borderline. Borderline was included in malignant group. The mean age of patients with benign disease was  $35.23 \pm 10.87$  and in those with malignant disease.
  4. On 2013 a study was made by MoszynskiRafal. The aim of study is to estimate the risk of false negative results in subjective interpretation of the ultrasound examination of ovarian tumor according to menopausal status. The study shows a conclusion that ultrasound evaluation of the adnexal masses has high specificity but even in the group of tumors considered benign in premenopausal as well as post-menopausal women malignancy can be found.,
  5. In 2011 the research was made by Maria a Pascual to estimate intra observer repeatability and inter observer agreement in: (1) describing adnexal masses using the International Ovarian Tumor Analysis. Intra- and inter observer agreement in classifying tumors as benign or malignant using the risk of malignancy cut-off of 10% for LR1 and LR2 was fair or good, whilst the reproducibility of subjective assessment was excellent
  6. This study was to assess the diagnostic performance of simple ultrasound rules to predict benignity/malignancy in an adnexal mass and to test the performance of the risk of malignancy index by Dirk Timmerman in 2010. Results of the 1938 patients with an adnexal mass, 1396 (72%) had benign tumors, 373 (19.2%) had primary invasive tumors, 111 (5.7%) had borderline malignant tumour, and 58 (3%) had metastatic tumour in the ovary. The simple rules yielded a conclusive result in 1501 (77%) masses, for which they resulted in a sensitivity of 92% (95% confidence interval 89% to 94%).
  7. The study is made that can discriminate between benign and malignant adnexal masses by VALENTIN in 2011. In this study the data of 3511 patients with an adnexal mass included in the International Ovarian Tumor Analysis (IOTA) studies. All patients had been examined using transvaginal gray-scale and Doppler ultrasound following a standardized research protocol carried out by an experienced ultrasound examiner using a high-end ultrasound system. About 7% of adnexal masses that are considered appropriate for surgical removal cannot be classified as benign or malignant by experienced ultrasound examiners using subjective assessment. Logistic regression models to estimate the risk of malignancy, CA 125 measurements and the RMI are not helpful in these masses.
  8. A study was made on the role between benign and malignant ovarian tumors by CharuwanTantipalakorn in 2014. A study of diagnostic performance was conducted on women scheduled for elective surgery due to ovarian masses. He concluded that the IOTA simple rules have high diagnostic performance in differentiating between benign & malignant adnexal masses
  9. The research was made by Caroline Van Holsbeke in 2009. To determine how accurately and confidently examiners with different levels of ultrasound experience can classify adnexal masses as benign or malignant and suggest a specific histological diagnosis when evaluating ultrasound images using pattern recognition. 166 masses were examined, of which 42% were malignant. Sensitivity with regard to malignancy ranged from 80 to 86% for the experts, was 70 and 84% for the 2 senior trainees and ranged from 70 to 86% for the junior trainees. The specificity of the experts ranged from 79 to 91%, was 77 and 89% for the senior trainees and ranged from 59 to 83% for the junior

- trainees. Expert sonologists can accurately classify adnexal masses as benign or malignant and can successfully predict the specific histological diagnosis in many.
10. The research was made by Raghu in 2013 to evaluate the efficacy of the combination of 2-dimensional (2D) and 3-dimensional (3D) contrast-enhanced sonography in discriminating between benign and malignant small adnexal masses. Selected patients were evaluated with both 2D and 3D contrast enhanced sonography after conventional sonography before undergoing any surgery. Forty-seven cases of benign and 10 cases of malignant small adnexal masses were discovered. Significant differences in perfusion patterns, time-intensity curve shapes for 2D contrast-enhanced sonography, grayscale contrast-enhanced sonography, and blood flow imaging on 3D contrast-enhanced sonography were observed between benign and malignant masses.
  11. In 2010 the research was carry out by C. VAN HOLSBEKE to determine the sensitivity and specificity of the 'ovarian crescent sign' (OCS) – a rim of normal ovarian tissue seen adjacent to an ipsilateral adnexal mass – as a sonographic feature to discriminate between benign and malignant adnexal masses. This study confirms previous reports that the presence of the OCS decreases the likelihood of invasive malignancy in adnexal masses. However, it is a poor discriminator between benign and malignant adnexal masses. The OCS was evaluated in 1377 adnexal masses from 12 centers, 938 (68%) masses being benign, 86 (6%) borderline, 305 (22%) primary invasive and 48 (3%) metastases. The OCS was present in 398 (42%) of 938 benign masses, in 14 (16%) of 86 borderline tumors, in 18 (6%) of 305 primary invasive tumors (one malignant struma ovarii, one uterine clear cell adenocarcinoma and 16 epithelial carcinomas, i.e. four Stage I and 12 Stage II–IV) and in two (4%) of 48 ovarian metastases.
  12. This research was made by Milan Terzić on 2011 on the evaluation of malignancy index. The aim of this study was to verify the effectiveness if the discrimination between benign lesions & malignant adnexal masses. The study shows that RMI is very reliable in differentiation benign from malignant adnexal masses. From all benign tumors ovarian cyst was the most frequent, while from the malignant tumors adenocarcinoma was found to be the most usual
  13. The study was made by HenriMarret, in 2013. To investigate the potential efficacy of real-time contrast-enhanced power Doppler sonography in the differentiation of benign and malignant adnexal masses in a pilot study. Before surgical treatment, adnexal masses were prospectively evaluated with power Doppler sonography before and after injection of a contrast agent. Real-time post injection sequences were computerized with time intensity analysis software to determine an enhancement curve and contrast parameters. Contrast-enhanced power Doppler imaging may easily and precisely discriminate benign from malignant adnexal lesions. Larger studies are needed to determine the appropriate use and benefits of this new procedure.
  14. In 2007 a research was made by Ben van caster on discrimination between benign and malignant adnexal masses. This was a multicenter study — the International Ovarian Tumor Analysis — 1066 women with a persistent adnexal mass underwent transvaginal gray-scale and color Doppler ultrasound examinations by an experienced examiner within 120 days of surgery. Pattern recognition was used to classify a mass as benign or malignant. Pattern recognition correctly classified 93% (95% confidence interval [CI] = 90.9% to 94.6%) of the tumors as benign or malignant. Serum CA-125 correctly classified at best 83% (95% CI = 80.3% to 85.6%) of the masses. Histologic diagnoses that were most often misclassified by CA-125 were fibroma, endometrioma, and abscess (false-positive results) and borderline tumor (false-negative results). Pattern recognition correctly classified 86% (95% CI = 81.1% to 90.4%) of masses of these four histologic types as being benign or malignant, whereas a serum CA-125 at a cutoff of 30 U/mL correctly classified 41% (95% CI = 34.4% to 47.5%) of them. Pattern recognition assigned a correct specific histologic diagnosis to 333 (59%, 95% CI = 54.5% to 62.8%) of the 567 benign lesions.
  15. In 2019 the study is made by J. J. HIDALGO. To determine the sensitivity and specificity of the 'ovarian crescent sign' (OCS) – a rim of normal ovarian tissue seen adjacent to an ipsilateral adnexal mass – as a sonographic feature to discriminate between benign and malignant adnexal masses. The subgroup

comprised 1938 patients, with an adnexal mass, recruited from 19 ultrasound centers in different countries. All patients were scanned using the same standardized ultrasound protocol. Information on more than 40 demographic and ultrasound variables were collected. This study confirms previous reports that the presence of the OCS decreases the likelihood of invasive malignancy in adnexal masses. However, it is a poor discriminator between benign and malignant adnexal masses.

16. In 2002 a research was mad by Juan Luis Alcázar. The purpose of this study was to develop and cross-validate a new sonographic scoring system for differentiation between benign and malignant adnexal masses. This study was conducted in a tertiary care university hospital. In the first part of the study, we used a multivariate logistic regression analysis to develop a scoring system that was based on morphologic and Doppler sonographic data for 705 adnexal masses in 665 patients who were diagnosed and treated at our institution from January 1995 to June 2001. The scoring system was designed to use only those parameters that are found to be independent predictors of malignancy. In the second part of the study, we prospectively cross-validated this scoring system in a series of 90 adnexal masses in 86 patients between July 2001 and March 2002. Our new sonographic scoring system had a better diagnostic performance than three previously published scoring systems.
17. In 1994 Sharon made a study on differentiation of benign & malignant adenaxal masses. The purpose of this study was to evaluate prospectively the relative usefulness of color Doppler, spectral Doppler, and gray-scale sonography in differentiating benign from malignant adnexal masses by Sharon M in 1994. In this study total of 170 adnexal masses in 161 patients were classified prospectively as suggestive of or not suggestive of malignant tumor on the basis of gray-scale morphology, internal flow versus peripheral or no flow. On gray scale analysis, 46 of the 47 malignant masses were classified as suggestive of tumor, and 76 of the 123 benign masses were classified as not suggestive of tumor.

#### Study selections:

Multiple articles were reviewed. Prospective studies and case reports were excluded from the data. Retrospective studies were included in the study.

#### RESULTS:

Using the search criteria, 17 researches were examined based on the title and abstract.

All the 17 studies were considered in their full versions. Of these works, including literature review or meta-analysis reports, it was concluded that ultrasound gray scale & Doppler studies have a positive relationship with adnexal benign & malignant tumors.

#### DISCUSSION:

Evaluation of the adnexa is an integral part of the gynecologic examination. Because early adnexal disease rarely is symptomatic, the pelvic examination serves as a primary screening method for asymptomatic adnexal disease. An accurate adnexal assessment is even more important in postmenopausal women because of higher incidence of ovarian cancer, often with no early signs and symptoms (16)

Use of grayscale ultrasound combined with Doppler measurements when necessary allows the experienced sonographer to reliably diagnose functional, benign, and malignant adnexal masses (17) The information obtained from the pelvic ultrasound, combined with patient's history and gynecologic exam, will guide recommendations from treatment, primarily the decision for conservative follow-up versus surgery.

Compared to conventional ultrasound and CA 125, color Doppler ultrasound was more accurate in discriminating malignancies from benign tumors. The best use for this technique seems in giving further preoperative information about masses with uncertain sonographic characteristics. allowing better timing and tailoring of surgery.

#### CONCLUSION:

We conclude from our discussion that ultrasonography is definitely an important noninvasive investigation and is helpful in diagnosing most cases of functional ovarian cysts, benign ovarian neoplasm and ovarian malignancy; but the histopathological examination of specimen obtained from laparotomy/laparoscopy of adnexal mass is the gold standard for confirming the diagnosis. Although bimanual palpation of the adnexal masses may not allow a very specific diagnosis, clinically useful information can usually be obtained and hence it is particularly useful as a first step in assessment of adnexal masses and as an adjunct to morphological assessment of ovarian lesions. However no single diagnostic aid can be used to determine the pathological adnexal masses. Hence a

multifaceted diagnostic approach should be used for a definite diagnosis and management of adnexal mass.

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