



## Incidentally Detected Adnexal Masses

- **Incidental adnexal masses are common in both pre- and postmenopausal women; the vast majority are benign**
- **Ultrasound demonstrates high sensitivity but low specificity for detecting ovarian cancer. MRI evaluation of adnexal masses indeterminate on ultrasound increases specificity, decreasing resection of benign lesions**
- **An algorithm to evaluate adnexal masses with imaging is presented. The goal is to identify patients with definitely benign lesions from those that require further clinical evaluation for ovarian cancer**

Ovarian cancer is the leading cause of death from gynecological cancers, with 22,480 estimated new cases and 15,280 deaths in 2007. If it is diagnosed at Stage I, there is an almost 90% survival rate at 5 years; but if diagnosed at an advanced stage, as are most cases, the 5 year survival rate is <30%. Several screening programs, undertaken with the hope of detecting ovarian cancer at an early stage, have provided valuable insight into the incidence of adnexal masses, their natural history, and strategies for their management.

### Natural History of Adnexal Masses

Screening trials using imaging have proven unsuccessful because benign adnexal lesions are relatively common whereas ovarian cancer is rare. In one study following >15,000 asymptomatic postmenopausal women over an average period of 6.3 years, 18% developed unilocular cysts of which 69% resolved spontaneously. In the 10 women diagnosed with ovarian cancer, the cysts either developed complex features, resolved before diagnosis, or the cancer developed in the contralateral ovary. The risk of cancer eventually developing from a unilocular cyst was calculated to be <0.1%. Complex ovarian cysts show a reported incidence of 3.2% in postmenopausal women 55% of which resolve within 60 days.

Screening trials have also revealed that the majority of ovarian cancers demonstrate very rapid growth. In one study, the frequency of ovarian cancer in women with persistent complex cysts was 6.1% and all but one grew during the 4-6 week period between initial detection and follow-up scanning. In another, in which women were examined every 6 months with transvaginal ultrasound, all 10 of the ovarian cancers detected were at advanced stage (III or IV), having developed within the 6 month interval between screenings. From this, the authors estimated a tumor volume doubling time for ovarian cancer of <3 months and concluded that periodic imaging is ineffective in early detection.

**Table 1. Incidence of Ovarian Cysts**

Ovarian cyst	Estimated Prevalence	Risk of Malignancy
Unilocular Ovarian Cyst	Postmenopausal, <10 cm: 3-18%	0 - 0.1%
	Postmenopausal, >2.5 cm: 6.4%	
	Premenopausal, >2.5 cm: 12.6%	
Complex Ovarian Cyst	Postmenopausal, 3.2%	3%

### Incidental Adnexal Lesion Seen in Imaging

An algorithm for the use of imaging for the evaluation of incidentally detected adnexal masses is shown in Figure 1. An adnexal lesion found incidentally, usually on CT or ultrasound examination, does not need further imaging characterization if it is obviously malignant, e. g. concurrent omental implants, other evidence of peritoneal disseminated disease, or lymphadenopathy. In addition, simple cysts less than 5-6 cm, with no solid components in a premenopausal woman, are likely benign and do not require further imaging. (Simple cysts that are larger may warrant additional imaging to document resolution as these cysts can torsion and may need to be removed surgically if they persist). On the other hand, lesions found in postmenopausal women and those that have solid components require further evaluation. For this purpose, follow-up imaging (usually within 6 weeks) is recommended either with ultrasound or MRI. Adnexal lesions can be definitively characterized as benign if they demonstrate specific imaging features or if they resolve on follow-up imaging. If not definitely benign on follow-up, the patient should be evaluated clinically to exclude the possibility of ovarian cancer.

Clinical evaluation for ovarian cancer includes medical and family history, physical exam and serum CA-125 levels which, in combination with imaging findings, determine the index of suspicion and guide referral to a gynecologic oncologist. Neither imaging results (Table 2) nor CA-125 levels alone are sufficiently accurate to diagnose ovarian cancer. CA-125 is elevated in 90% of women with advanced ovarian cancer but only in 50% of those diagnosed with stage I disease. In addition, CA-125 elevation is associated with many other benign conditions, including pregnancy, leiomyomas, liver or kidney disease, pelvic inflammatory disease, endometriosis, and benign ovarian tumors.

Because of the observed rapid doubling time for ovarian cancer, if imaging cannot quickly characterize an ovarian lesion as benign, or if clinical indicators (e.g. CA-125 levels) or patient risk factors, (e.g. family history or genetic markers) suggest cancer, current recommendations are that the lesion should be resected rather than followed. Because all these indicators even in combination are nonspecific, surgical removal is >3 times more likely to yield a benign mass than a cancer.

**Table 2. Diagnosis of Ovarian Malignancy with Imaging for Asymptomatic Adnexal Masses**

Modality	Sensitivity	Specificity
Trans Vaginal Ultrasound (TVUS)	92	60
MRI	83†	84†
MRI after indeterminate US*	81	98

Data from McDonald and Modesitt, 2006

\*Includes both asymptomatic and symptomatic masses.

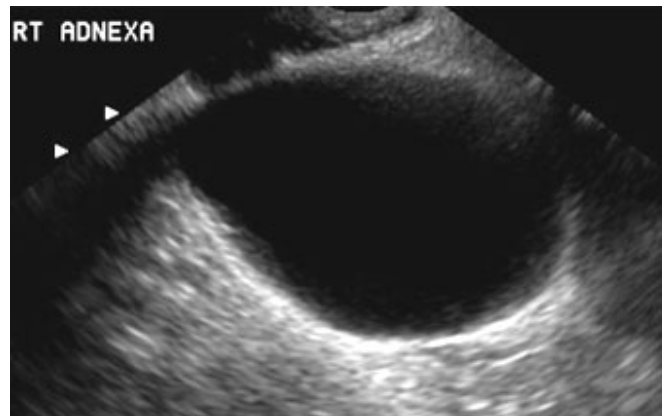
† MRI sensitivity and specificity, 96.6 and 83.7, respectively, in study of women with clinically suspected adnexal masses.

### Ultrasound Characterization of Adnexal Masses

Incidental adnexal masses represent a wide variety of pathologies including functional cysts, sequelae of prior infection, endometriosis, benign or malignant neoplasms, and those originating from adjacent pelvic organs. The goal of imaging is to differentiate between benign and malignant disease. Transvaginal ultrasound (TVUS) is the preferred method for initial evaluation. It is usually combined with transabdominal ultrasound, which may be necessary to detect both ovaries and can detect ancillary features of malignancy such as hydronephrosis, ascites, and pleural effusions.

Ultrasound features of a benign mass (Figure 2) are a simple unilocular cyst with a thin smooth wall. Complex cysts with hyperechoic regions may indicate a dermoid, and cysts with uniform hypoechoic texture can suggest endometriomas. These are benign lesions, which when suspected on ultrasound, are often referred for definitive characterization with MRI (Figure 2). Because ultrasound features suggesting a benign lesion are well understood, the reported negative predictive value of ultrasound for malignancy is high at 98%.

Features suggestive of malignancy include that of a complex cyst (Figure 3) with thickened walls, septations, papillary solid components and flow detected on Doppler. However, because many physiologic cysts and benign tumors have similar characteristics to malignancy, specificity of ultrasound for ovarian cancer is low (Table 2).

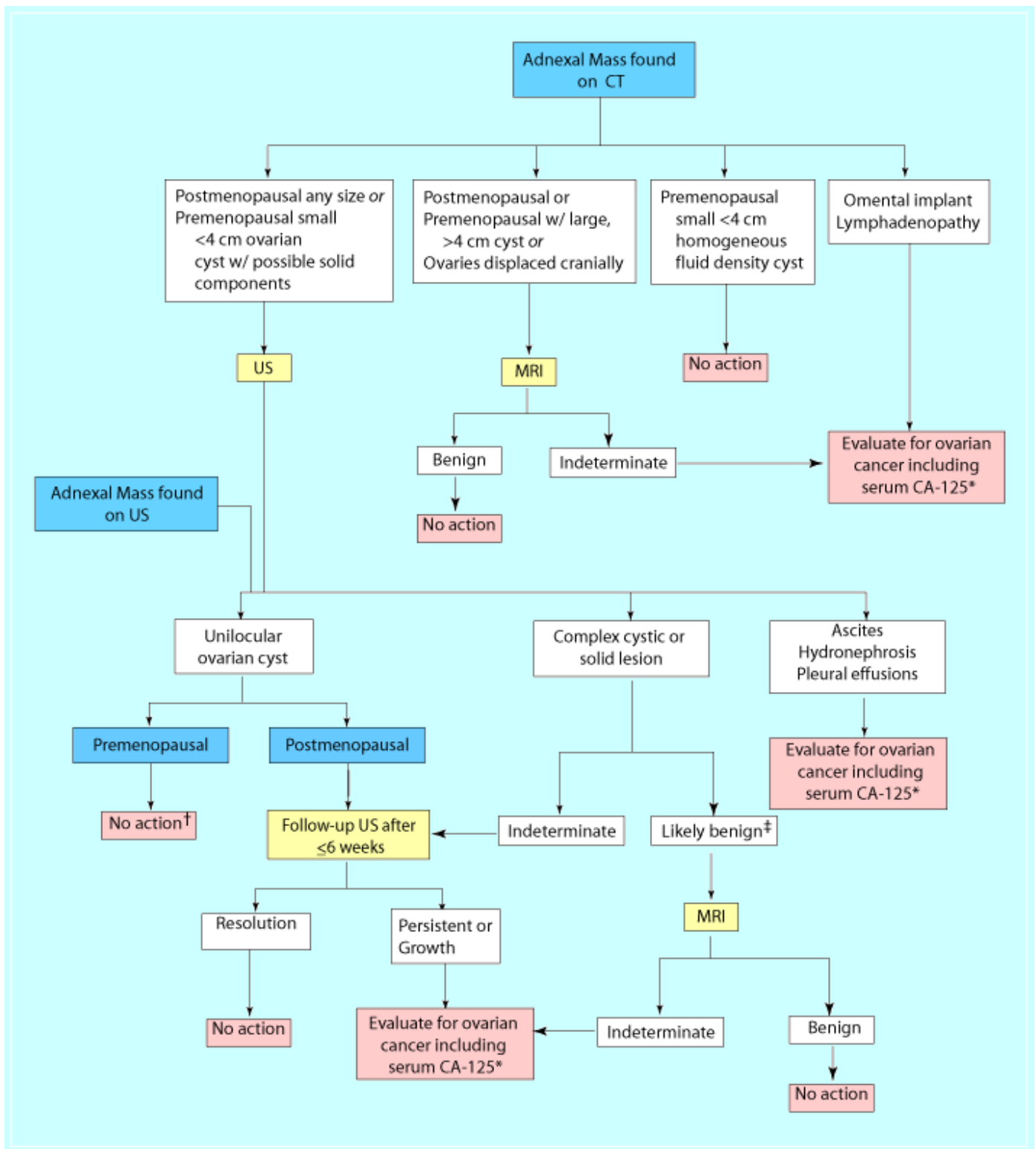


**Figure 2. Benign Cyst** - Transvaginal ultrasound image of the right adnexa in this postmenopausal patient reveals a 2.0 cm simple unilocular cyst. This completely resolved on follow-up imaging in 3 months.

### MRI Characterization of Adnexal Masses

MRI reduces the number of surgeries on benign adnexal lesions by definitively characterizing them in selected cases. Adnexal lesions with ultrasound features suggesting an endometrioma, dermoid, or an extra-ovarian lesion (e.g. hydrosalpinx, peritoneal inclusion cyst, peritubal cyst), or those appearing homogeneously solid (ovarian fibroma or exophytic uterine or broad ligament fibroid) are further characterized by MRI. However, MRI is usually not helpful for characterizing many complex cystic intra-ovarian masses. When ovarian lesions that are indeterminate on ultrasound are then examined with contrast enhanced MRI, the sensitivity and specificity of the combined examinations for ovarian cancer are 81% and 98%.

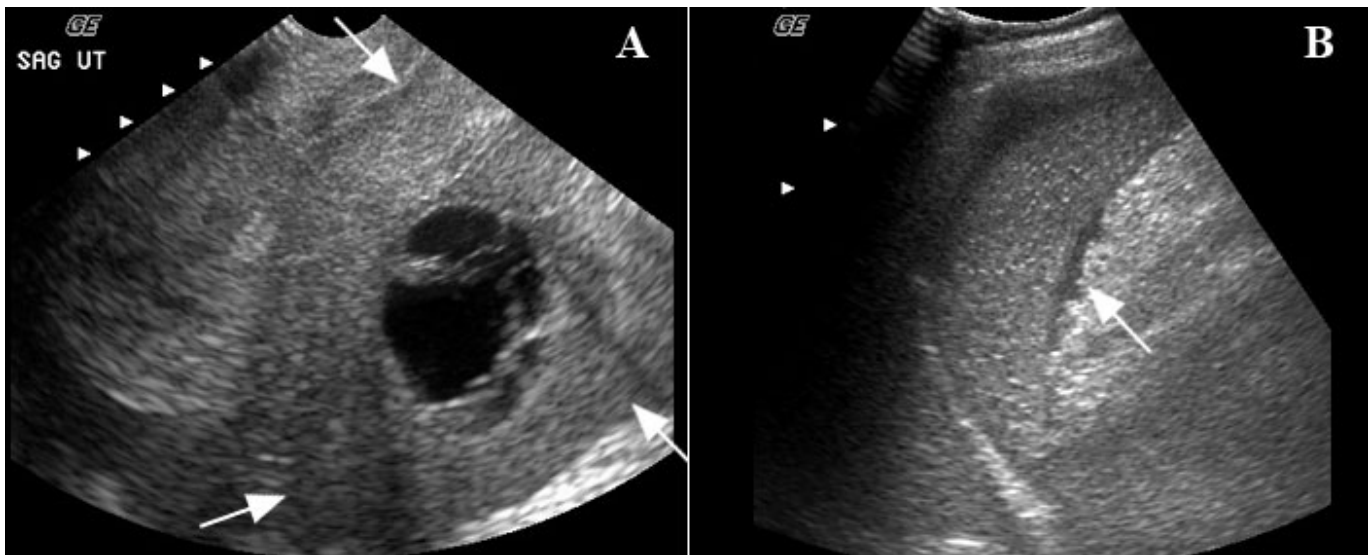
Figure 1. An algorithm for incidental adnexal mass evaluation



\*If CA-125 elevated, refer to gynecologic oncologist. If CA-125 normal, refer to general gynecologist or gynecologic oncologist based on clinical assessment of risk for ovarian cancer.

†May need evaluation by gynecologist if symptomatic or large size (>5-6 cm) could cause torsion

‡Suspect endometrioma, dermoid, fibroma, exophytic fibroid, or peritoneal inclusion cyst



**Figure 3. Ovarian Cancer** - Transvaginal ultrasound image of the pelvis (A) demonstrates a large complex cystic mass (arrows). Transabdominal ultrasound image of the upper abdomen (B) demonstrates ascites (arrow) around the liver.

### Scheduling

Ultrasound can be performed at all MGH imaging facilities and MRI can be performed at Mass General Imaging in Waltham, Mass General Imaging Chelsea, or the main MGH campus. These studies can be ordered online via the Radiology Order Entry (<http://mghroe>) or by calling 4-XRAY (617-724-9729).

### Further Information

For further questions on imaging of adnexal masses, please contact [Susanna I Lee, M.D.](#), Staff Radiologist in the Abdominal Imaging and Intervention Division at 617-726-8396.

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