Development of Ovarian Cancer in Ultrasound Indeterminate Ovarian Lesions: Incidence and Tumor Type

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Study Goal

• The goal of this study is to determine the incidence of ovarian cancer in sonographically indeterminate cystic ovarian lesions
Background

- Ovarian cancer has the highest mortality of any of the gynecologic malignancies with an overall 5 year survival rate of 47% (cancer.org)
- Early identification of ovarian cancer significantly improves patient outcomes
- The ability to identify potentially malignant ovarian lesions by imaging is critical in early detection
- Approximately 23% of incidentally found adnexal lesions cannot be classified as benign or malignant by a single ultrasound\(^1\)

Background

- Cystic ovarian lesions >5cm in size\(^1\), or with thick, avascular septations and/or soft tissue components are considered sonographically indeterminate\(^2,3\)

- The incidence of ovarian cancer in ultrasound indeterminate lesions is not well documented

Methods: Subjects

• IRB-approved, HIPAA compliant retrospective imaging review study

• General low-risk outpatients from multiple academic centers: UW, UM, Duke
  – Non-pregnant
  – Post-menarchal women of any age who underwent a transvaginal ultrasound exam between October 2010 and November 2011
Methods: Procedures

• Review of transvaginal US exams from October 2010 to June 2011:
  – Cystic ovarian lesions were identified and a fellowship-trained abdominal radiologist reviewed the US images, recording:
    • Cyst type
    • Number and thickness of septations
    • Number and greatest size of soft tissue nodules
    • Presence or absence of flow in any soft tissue component

• Clinical and imaging records were reviewed to document follow-up and outcome:
  – Patients were included if one of the following was true:
    • Resolution or decrease in lesion size on follow-up imaging
    • Surgical pathology was available
    • Normal pelvic exam ≥2 years from the baseline study was documented
Methods: Inclusion/Exclusion

• **Included cystic lesions:**
  - $\geq 5$ cm
  - Thick, avascular septations
  - Avascular soft tissue components
  - Atypical hemorrhagic cysts, atypical dermoids, atypical endometriomas

• **Excluded lesions:**
  - Ovarian lesions with blood flow in the internal soft tissue components
  - Classic appearing lesions $\leq 5$cm in diameter
    - Simple cysts, endometriomas, hemorrhagic cysts, dermoids
  - Solid lesions

857 cystic adnexal lesions

233 lesions included in the final study population

Final study population 226 cysts in 215 women

624 lesions excluded for not meeting “indeterminate” criteria

7 lesions excluded due to insufficient follow-up data
Lesion selection: Size ≥ 5cm

- A 7.2 cm simple left ovarian cyst in a 54 year-old, which enlarged slowly on follow-up imaging
- Pathology showed benign serous cystadenoma
- Lesions ≥5cm are considered incompletely evaluated by ultrasound, and therefore indeterminate

Lesion selection: Thick septation (>3mm) without blood flow

• A 38 year-old asymptomatic female with a 5cm complex adnexal lesion, with a single, avascular, thick septation (yellow arrow)

• Pathology showed mucinous cystadenoma
Lesion selection:
Soft tissue nodule without blood flow

- A 2.4 cm complex left ovarian cyst with a 4 mm avascular soft tissue nodule (yellow arrow) in a 52 year-old
- Pathology showed serous cystadenofibroma
Lesion selection: Atypical dermoid

- A 31 year-old female with a 6 cm complex lesion, with atypical features for dermoid (dots, no dashes) and a septation (yellow arrow)

- Pathology showed mucinous cystadenocarcinoma
Lesion selection: Atypical endometrioma

- 48 year-old asymptomatic peri-menopausal female with a 5cm complex adnexal lesion: homogenous echoes, similar to an endometrioma, however, there is also a thick septation (blue arrows) and apparent soft tissue nodules (yellow arrows), with no internal blood flow.

- Pathology showed endometroid adenocarcinoma.
Results: Patients

• Mean age of 41.3 +/- 14 years
  – Age range: 14-85 years
• Menstrual status:
  – 72.5% pre-menopausal
  – 23.2% post-menopausal
  – 4.3% unknown menstrual status
• Follow-up inclusion:
  – 50.4% by imaging
  – 47.4% by pathology
  – 2.2% by clinical follow-up
Results: Lesion types by imaging

• 856 total cystic ovarian lesions
• 27.2% indeterminate lesions (n=233)
  – 39.9% complex cysts
  – 29.2% simple cysts
  – 11.6% classic hemorrhagic cyst ≥5cm
  – 11.2% atypical hemorrhagic cyst
  – 3.4% classic endometrioma ≥5cm
  – 1.7% classic dermoid ≥5cm
  – 1.7% atypical dermoid
  – 1.3% atypical endometrioma
Results: Lesions

- Non-neoplastic, benign (n=165)
  Endometriomas, follicular and hemorrhagic cysts

- Neoplastic, benign (n=53)
  Cystadenomas, cystadenofibromas, dermoids/mature teratomas

- Malignant (n=8)
  Borderline, low-grade and high-grade
Results: Benign Non-neoplastic Lesions

- Endometrioma (n=19)
- Follicular cyst (n=14)
- Hemorrhagic cyst (n=11)
- Other* (n=4)

*One each of stromal hyperplasia, peritoneal inclusion cyst, tubo-ovarian abscess, and xanthogranulomatous inflammation
Results: Benign Neoplastic Lesions*

- Serous cystadenoma** (n=31)
- Mature teratoma (n=10)
- Mucinous cystadenoma (n=6)
- Serous cystadenofibroma (n=5)

*Total n=53 overall, however one lesion was included by imaging alone due to gradual enlargement over 2 years. No resection was performed.

**One serous cystadenoma lesion contained a synchronous Brenner tumor and one contained a focus of atypia.
Results: Malignant Lesions

- Non-invasive tumors (n=3)
  - Borderline tumors: 2/3 were bilateral lesions in the same patient

- Invasive tumor (n=5)
  - 1 metastatic adenocarcinoma from colon primary
  - 1 low grade mucinous adenocarcinoma
  - 1 low grade serous carcinoma
  - 1 clear cell carcinoma
  - 1 adenocarcinoma with both serous and clear cell features

- 5/8 (62.5%) patients with malignant lesions were pre-menopausal
- 3/8 (37.5%) patients with malignant lesions were post-menopausal
Discussion

• Of the 226 included indeterminate adnexal lesions, 73% were non-neoplastic, 23.5% were benign ovarian neoplasms, and 3.5% were malignant ovarian neoplasms
  • There is a high percentage of pre-menopausal women in our study population (72.1%), which may account for the high incidence of non-neoplastic lesions
Discussion

• Endometriomas were the most common benign, non-neoplastic lesions identified in this study.
• Serous cystadenoma was the most common benign neoplasm, followed by mature teratoma.
• Of the malignant lesions, 3 were borderline tumors and 4 lesions were invasive cancers of ovarian origin.
Limitations

- Retrospective study
- Low-risk outpatient population with a high percentage of pre-menopausal patients
- Small number of malignancies
Summary

• The incidence of indeterminate ovarian lesions in our population was 27%.
• Benign lesions accounted for a significant proportion of these lesions (96%).
• Malignancy was identified in a small but significant proportion of patients (4%).
• Our findings highlight the importance of follow-up of sonographically indeterminate ovarian lesions.
  • Follow-up by US or MRI, or surgical consultation can be considered based on the clinical picture.
• Follow-up of these lesions is a future area of research, as currently there are no evidence-based guidelines to suggest which method of follow up is best.
Thank you for your attention!

Questions or comments?
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