# AGI26

55TH GLOBAL CONGRESS ON MIGS

BOSTON, MASSACHUSETTS
NOVEMBER 13-16, 2026

# Syllabus

## PG-14002

Oncology and Adnexal Masses: Risk Stratification, Imaging Algorithms, and Emerging Technologies


HONORARY CHAIR
Charles H. Koh, MD

SCIENTIFIC PROGRAM CHAIR
Nash S. Moawad, MD

PRESIDENT
Michael Hibner, MD, PhD




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**PG-14002: Oncology and Adnexal Masses:**
**Risk Stratification, Imaging Algorithms, and Emerging Technologies**

**Chair:** Alessandra Di Giovanni
**Co-Chair:** Jubilee Brown
**Faculty:** Jubilee Brown, Afchine Fazel, Priyanka Jha, Ligita Jokubkiene

**Course Description**

The accurate characterization of adnexal masses remains one of the most challenging and clinically relevant areas of gynecologic imaging. The introduction of standardized ultrasound terminology, validated risk prediction models, and structured reporting systems has significantly improved diagnostic performance and patient triage. This postgraduate course will provide participants with a comprehensive and practical overview of the current approach to adnexal lesion assessment, integrating ultrasound and MRI-based risk stratification tools with evidence-based management pathways.

The course will review the role of O-RADS Ultrasound and O-RADS MRI in lesion characterization, discuss the major achievements and future perspectives of the IOTA group in advancing ultrasound diagnosis of adnexal masses, and explore the emerging contribution of artificial intelligence to clinical decision-making. Particular emphasis will be placed on identifying patients who can be safely managed conservatively, those requiring referral to expert ultrasound centers, and those who should be referred to gynecologic oncology units.

**Learning Objectives:** *At the end of this course, the participant will be able to:* 1) Describe the principles and clinical applications of contemporary imaging-based risk stratification systems for adnexal masses, including O-RADS US, O-RADS MRI, and IOTA models; 2) Apply evidence-based diagnostic and management algorithms to optimize patient triage and determine when referral to gynecologic oncology is indicated; and 3) Evaluate the potential role of artificial intelligence in improving diagnostic accuracy, reproducibility, and clinical workflow in adnexal mass assessment.

**Course Outline**

| | | |
|---|---|---|
| 8:00 am | Welcome, Introduction and Course Overview | A. Di Giovanni |
| 8:05 am | The IOTA Journey: What We Learned from Ultrasound Evaluation of Adnexal Masses and Future Directions | L. Jokubkiene |
| 8:30 am | The Roles of O-RADS Ultrasound and O-RADS MRI In the Evaluation of Adnexal Lesions | P. Jha |
| 8:55 am | Artificial Intelligence in Adnexal Mass Assessment: What Can AI Add to Current Diagnostic Tools? | A. Fazel |
| 9:20 am | Decision Making: Adnexal Masses and the Risk of Cancer | J. Brown |
| 9:45 am | Discussion Questions & Answers | All faculty |
| 10:00 am | Adjourn | |

**ADA Statement:** In accordance with the Americans with Disabilities Act (ADA), please contact CMEsupport@aagl.org should you require any special assistance.

**Disclosure of Relevant Financial Relationships**

As an ACCME-accredited provider, AAGL is responsible for ensuring that accredited education is fair, balanced, free of commercial bias, and supports safe, effective patient care. AAGL maintains control over all aspects of educational planning, content, faculty selection, delivery, and evaluation.

All individuals in a position to control educational content are required to disclose financial relationships with ACCME-defined ineligible companies within the past 24 months. AAGL identifies and mitigates all relevant financial relationships before individuals assume their respective roles. Educational content is also subject to independent peer review by individuals without relevant financial relationships.

Disclosure information and acknowledgment of any commercial support are provided to learners before the activity to promote transparency and maintain the independence and integrity of the education.

Asterisk (*) denotes no financial relationships with ACCME-defined ineligible companies to disclose.

**PLANNER DISCLOSURES**

**The following members of AAGL have been involved in the educational planning and/or review of this course (listed in alphabetical order by last name).**

**PROFESSIONAL EDUCATION COMMITTEE**

Harold Wu, MD* - Chairman
Adrian Balica, MD*
Jamal Mourad, DO – Proctor: Intuitive Surgical
Jude Okohue, MD*
Steven Radtke, MD*
Anna Reinert, MD*
Jean Uy-Kroh, MD*
Linda Bradley, MD, AAGL Medical Director*
Linda Michels, AAGL Executive Director*
Linda Bell, AAGL Admin Support*
Nancy Williams, COO, CME Consultants*

**SCIENTIFIC PROGRAM COMMITTEE**

Nash Moawad, MD, MS, Chairman – Consultant (ended 12/2024): Medtronic, Womed, Integra Life Sciences
Amani Harris, MD*
Ted Lee, MD – Advisory/Consultant: Johnson & Johnson, Regeneron Pharmaceuticals
Nucelio Lemos, MD, PhD – Speakers Bureau: Pfizer, Inc., Medtronic; Advisory Board: Knight Therapeutics, Vecfer Pharma
Mario Malzoni, MD*
Emad Mikhail, MD – Consultant: Johnson & Johnson
Hannah Palin, MD*
Megan Wasson, DO*
Michael Hibner, MD, PhD*
Jose "Tony" Carugno, MD*
Angela Chaudhari, MD - Consultant: Tag/Dream Medical, Johnson & Johnson; Speakers Bureau: Johnson & Johnson
Linda D. Bradley, MD, Medical Director*
Linda Michels, Executive Director, AAGL*

**COURSE CHAIR DISCLOSURE**

Alessandra Di Giovanni, MD*

**COURSE CO-CHAIR DISCLOSURE**

Jubilee Brown, MD – Consultant: Abbie, AstraZeneca, Caris Life Sciences, Corcept, Eisai, GlaxoSmithKline, Natera Inc.

**FACULTY DISCLOSURES**

**The following faculty have agreed to support their presentations and clinical recommendations with the best available evidence from the medical literature (in alphabetical order by last name).**

Jubilee Brown, MD – Consultant: Abbie, AstraZeneca, Caris Life Sciences, Corcept, Eisai, GlaxoSmithKline, Natera Inc.
Afchine Fazel, MD, PhD*
Priyanka Jha, MBBS, FSRU*
Ligita Jokubkiene, MD, PhD - Speakers Bureau: Samsung, GE Healthcare, Sonoscape, Merck & Co., Gedeon Richter Pharmaceuticals

**MITIGATION OF RELEVANT FINANCIAL RELATIONSHIPS**

**All relevant financial relationships have been mitigated.**

Drs. Lee, Lemos, Mikhail, and Chaudhari's planning decisions, as part of the Scientific Program Committee (SPC), were peer reviewed by other planners on the SPC who had disclosed no financial relationships with ineligible companies, and found to be fair, balanced, and free of commercial bias. Dr. Moawad's financial relationships ended 12/2024, thus mitigating them. For most of his AAGL Professional Education Committee service, Dr. Mourad had no financial relationships to disclose. He recently disclosed a new relationship as a Proctor for Intuitive Surgical. Since then, he has not participated in activities involving control or influence over accredited educational content; therefore, no additional mitigation was necessary.

Dr. Brown's role as Course Co-Chair was limited primarily to course oversight and moderation, rather than development of educational content. Any planning decisions or content under her influence were subject to independent peer review by individuals without relevant financial relationships.

The presentation content for course faculty, Drs. Brown and Jokubkiene, has been peer reviewed and found to be fair, balanced, and free from commercial bias.

# The IOTA journey: what we have learned from ultrasound evaluation of adnexal masses and future directions

Ligita Jokubkiene, Associate professor, MD, PhD
Lund University
Sweden

NOVEMBER 13-16, 2026 · BOSTON · #AAGL26

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## Disclosure

- Speaker fees from
- Samsung, GE, Sonoscape, Gedeon Richter, Merck

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## Adnexal masses

| 01 | 02 | 03 |
|---|---|---|
| CLASSIFY | QUANTIFY | DIAGNOSE |
| Benign or malignant? | Estimate malignancy risk | Name the specific diagnosis |

**IF BENIGN**

**Identify the characteristic pattern**

- Endometrioma
- Mature teratoma (dermoid)
- Cystadenoma
- Less common benign mass

**IF MALIGNANT**

**Define subtype and extent**

- Borderline or invasive?
- What stage?
- Primary or metastatic?

Classification → risk → specific diagnosis

3

## Diagnosis determines the care pathway

**Is surgery indicated?**

NO

**Is follow-up indicated?**

YES

**Who should operate?**

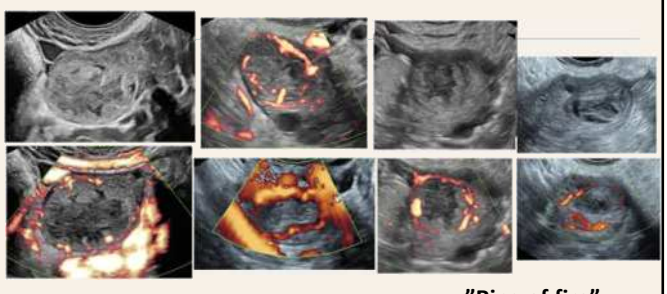
- General gynecological surgeon
- Gynecological oncologist

BEFORE SURGERY

**Are additional investigations needed?**

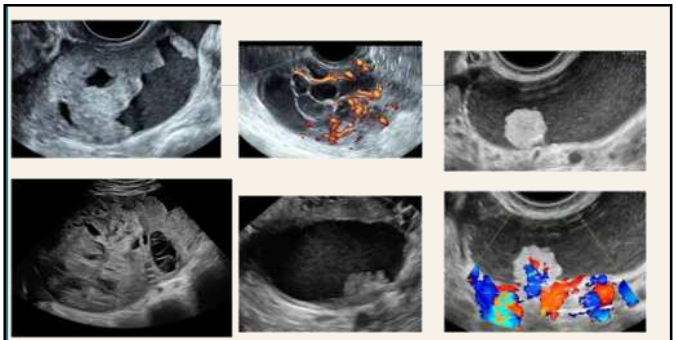
The diagnostic answer directs follow-up, referral and preparation for further management.

4



”Ring of fire”

5



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## A framework for adnexal assessment, IOTA journey

COMMON LANGUAGE

**IOTA terminology**

A consistent vocabulary for every assessment

STRUCTURED METHODS

01 Benign descriptors
02 Simple rules
03 ADNEX model
04 Two-step strategy
05 O-RADS

EXPERT ASSESSMENT

**Pattern recognition**

Clinical assessment applied across the framework

Common language → method application → expert interpretation

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## Consensus creates a common ultrasound language

IOTA TERMS AND DEFINITIONS

01 MEASURE — Adnexal masses
02 DEFINE — Ultrasound findings in the adnexa
03 DESCRIBE — Ultrasound findings in the adnexa

SHARED RESULT

**Consistent terminology for every assessment**

A standard way to measure, define and describe ultrasound findings

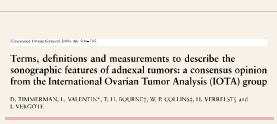
CONSENSUS PAPERS


Terms, definitions and measurements to describe the sonographic features of adnexal tumors: a consensus opinion from the International Ovarian Tumor Analysis (IOTA) group

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IOTA CONSENSUS TERMINOLOGY

## From the first consensus to the 2026 update


Terms, definitions and measurements to describe the sonographic features of adnexal tumors: a consensus opinion from the International Ovarian Tumor Analysis (IOTA) group


Terms, definitions and measurements to describe the sonographic features of adnexal tumors: updated consensus opinion from the International Ovarian Tumor Analysis (IOTA) Group

26 YEARS OF EVOLUTION

2000 — **Original consensus opinion**
First shared terms, definitions and measurements for describing adnexal tumor morphology.

2026 — **Updated consensus opinion**
Terminology refreshed to support clearer, more consistent use across IOTA methods.

Source: Ultrasound in Obstetrics & Gynecology, 2000 and 2026.

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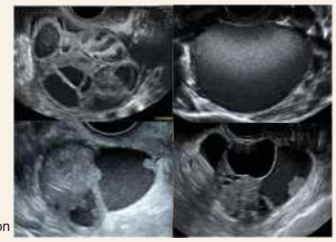
## Assessment of adnexal masses

**Morphology:**
lesion size, type and content

**Solid components:**
presence and size

**Papillary projections:**
presence and number

**Ultrasound features:**
acoustic shadows and vascularisation



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## Updated IOTA terminology



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## Updated IOTA terminology



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## Updated IOTA terminology

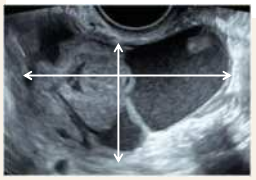




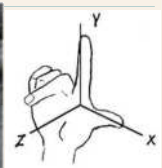


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## How to measure a lesion







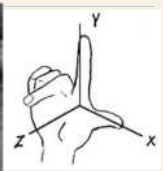

Three orthogonal measurement should be taken

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## How to measure a solid component

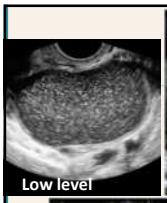







Three orthogonal measurements

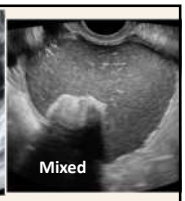
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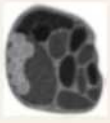


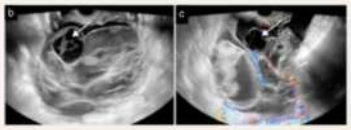
Types of cyst content

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## Update: variable cyst contents

Variable cyst contents

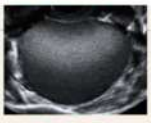




- Multilocular cyst exhibits different cyst content in different locules

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## Type of the mass


Unilocular


Unilocular-solid


Multilocular


Multilocular-solid


Solid

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## IOTA definition of a solid component

✓Structure of an echogenicity suggestive of tissue

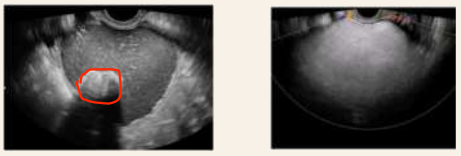


Solid component!

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## IOTA definition of a solid component

✓Structure of an echogenicity suggestive of tissue

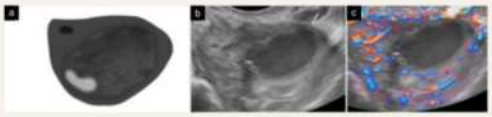


White ball – is not a solid lesion!

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## Update: definition of a solid component

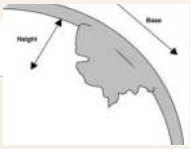
Structure of an echogenicity suggestive of tissue



Sludge in endometrioma is not a solid lesion/component

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## Papillary projection



- Any solid protrusion into the cyst cavity from the cyst wall of ≥ 3mm in height



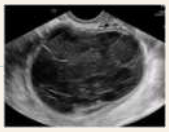
22

## Solid component and papillary projection

| Term | Definition |
|---|---|
| Solid component  | A solid component must have at least one diameter that is 3 mm or larger. Solid tissue with no diameter ≥ 3 mm is not classified as a solid component (Figure 4). |
| Papillary projection  | A papillary projection is a solid component protruding into the cyst cavity. It must have a height of ≥ 3 mm (Figure 4). If a protrusion of solid tissue with a height < 3 mm has any diameter of 3 mm or more (i.e. the maximum diameter of the base is 3 mm or more), then this protrusion is a solid component, but it is not a papillary projection. |

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## How to be sure solid or not?



- **If vascularized – solid component!**
  - BUT be aware of artifacts!
- **Push with the probe** – if the content moves – not solid
  - BUT be aware if necrosis (rare)! Be systematic and do not miss papillary projections
- **White ball – not a solid component!**
- If not sure – use worst case scenario
  - BUT be aware that the mass will be more likely to be classified as malignant and the models will result in higher malignancy risk

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## NOT a papillary projection

Solid protrusion into the cyst cavity of **<3mm** in height – **irregularity, not a papillary projection (solid component if any other diameter ≥3mm)**

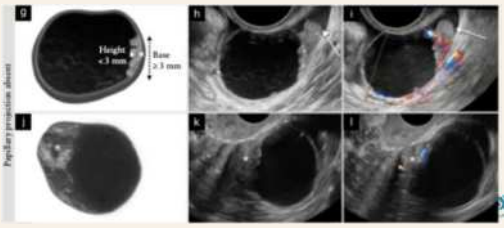


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## Not a papillary projection

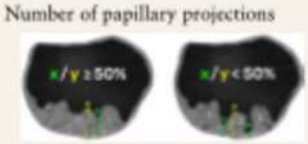
If one of three measurements ≥3mm – solid component!

If height is ≥3mm – papillary projection (AND solid component!



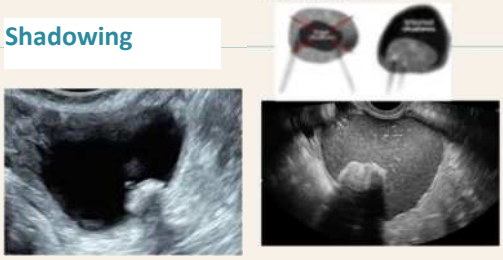

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## How to count number of papillary projections




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## Shadowing




Edge shadowing is an artefact from the rounded outer contour.

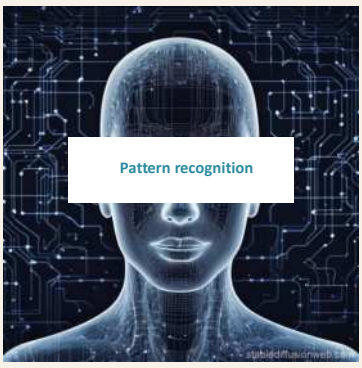
If attenuation gradually decreases – not a shadow (but loss of acoustic energy within the lesion)

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## Color score

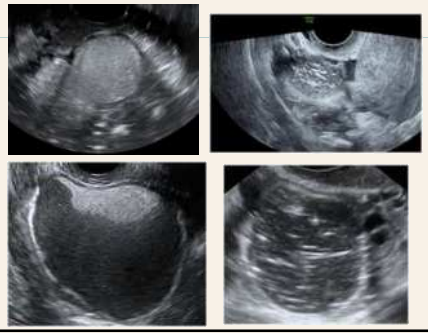



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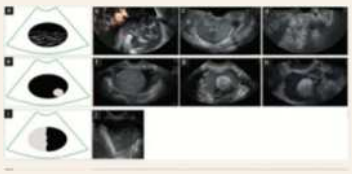

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## Dermoid cyst



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Imaging in gynecological disease (24): clinical and ultrasound characteristics of ovarian mature cystic teratomas



454 histologically confirmed mature teratomas

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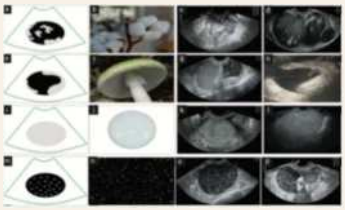
Imaging in gynecological disease (24): clinical and ultrasound characteristics of ovarian mature cystic teratomas

Cotton wool tuffs

Mushroom cap sign

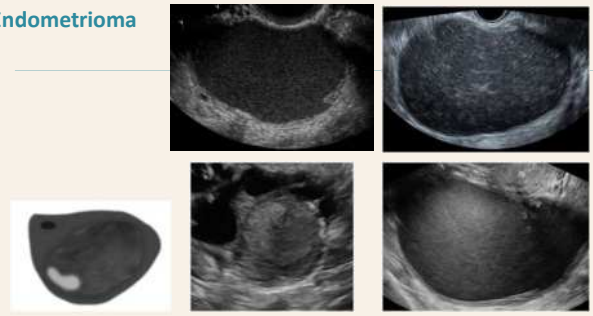
Elongated white ball

Starry night sky



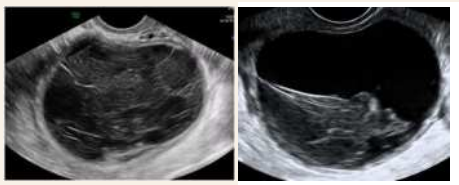
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## Endometrioma



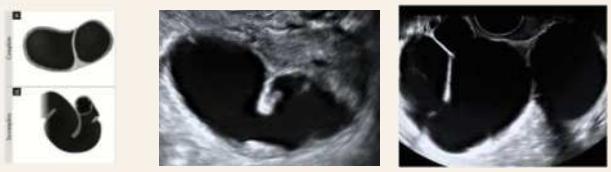
34

## Corpus luteum (hemorrhagic)



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## Hydrosalpinx

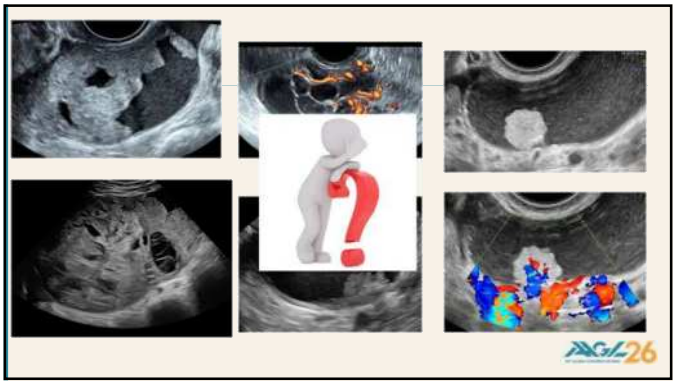


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## Ovarian fibroma



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## A framework for adnexal assessment

COMMON LANGUAGE — IOTA terminology

A consistent vocabulary for every assessment

STRUCTURED METHODS

01 Benign descriptors | 02 Simple rules | 03 ADNEX model | 04 Two-step strategy | 05 O-RADS

EXPERT ASSESSMENT

Pattern recognition — Clinical assessment applied across the framework

Common language → method application → expert interpretation

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## A framework for adnexal assessment

SHARED LANGUAGE — IOTA terminology/ORADS lexikon

A consistent vocabulary for every assessment

STRUCTURED METHODS

01 Benign descriptors | 02 Simple rules | 03 ADNEX model | 04 Two-step strategy | 05 O-RADS

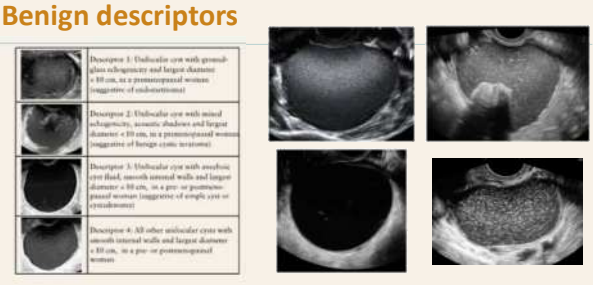
EXPERT ASSESSMENT

Pattern recognition — Clinical assessment applied across the framework

Language → structured methods → expert interpretation

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## Benign descriptors



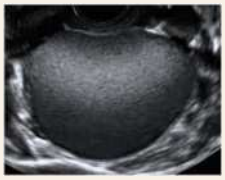
BDs could be applied in 1798/4905 (37%) tumors, of which 1786 (99.3%) were benign

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Benign descriptor 1

## Unilocular tumor with ground glass echogenicity in premenopausal woman <10cm

- Unilocular
- Ground glass
- Premenopausal



**Endometrioma**

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Benign descriptor 2

## Unilocular tumor with mixed echogenicity and acoustic shadows in premenopausal women <10cm

- Unilocular
- Mixed echogenicity
- Acoustic shadows
- Premenopausal



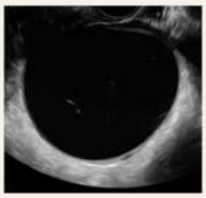
**Dermoid cyst/ Benign teratoma**

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Benign descriptor 3

## Unilocular tumor with regular walls and max diameter of the lesion of <10 cm in premenopausal or postmenopausal women

- Unilocular
- Regular walls
- Anechoic cyst fluid
- Max diameter <10 cm



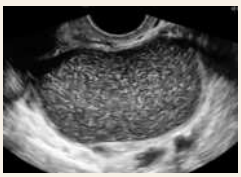
**Simple cyst or cystadenoma**

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Benign descriptor 4

## Remaining unilocular tumors with regular walls <10cm in premenopausal or postmenopausal women

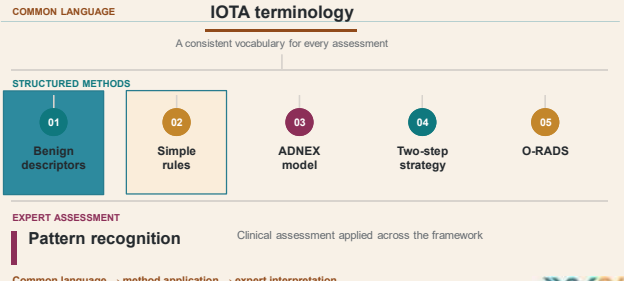
- Unilocular
- Regular wall



**Other benign cyst**

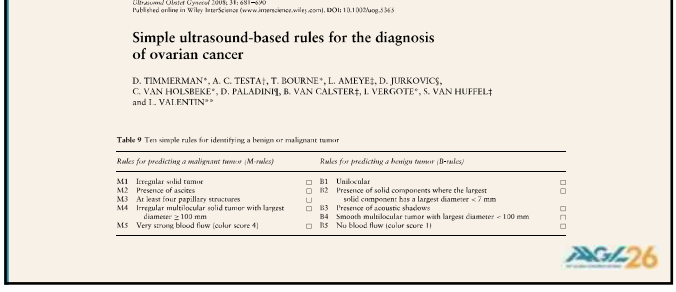
45

## A framework for adnexal assessment




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## Simple rules



Ultrasound Obstet Gynecol 2008; 31: 681–690
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/uog.5363

Simple ultrasound-based rules for the diagnosis of ovarian cancer

D. TIMMERMAN*, A. C. TESTA†, T. BOURNE*, L. AMEYE‡, D. JURKOVIC§, C. VAN HOLSBEKE*, D. PALADINI¶, B. VAN CALSTER‡, I. VERGOTE*, S. VAN HUFFEL† and L. VALENTIN**

Table 9 Ten simple rules for identifying a benign or malignant tumor

| Rules for predicting a malignant tumor (M-rules) | | Rules for predicting a benign tumor (B-rules) | |
|---|---|---|---|
| M1 Irregular solid tumor | ☐ | B1 Unilocular | ☐ |
| M2 Presence of ascites | ☐ | B2 Presence of solid components where the largest solid component has a largest diameter < 7 mm | ☐ |
| M3 At least four papillary structures | ☐ | | |
| M4 Irregular multilocular solid tumor with largest diameter ≥ 100 mm | ☐ | B3 Presence of acoustic shadows | ☐ |
| | | B4 Smooth multilocular tumor with largest diameter < 100 mm | ☐ |
| M5 Very strong blood flow (color score 4) | ☐ | B5 No blood flow (color score 1) | ☐ |

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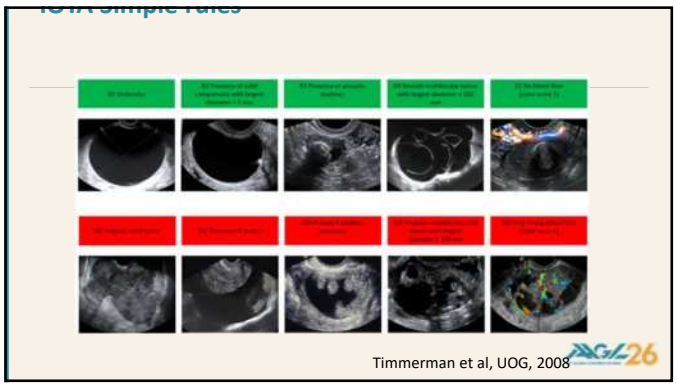
## Simple rules

- To classify ovarian mass as benign or malignant
- Pre-defined features
- Easy to apply

✓ 5 benign rules – B-rules
✓ 5 malignant rules – M-rules



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## Application of the Simple rules

**Benign features**

1. Unilocular cyst
2. Presence of solid components with largest diameter < 7 mm
3. Presence of acoustic shadows
4. Smooth multilocular tumor with largest diameter < 100 mm
5. No blood flow (color score 1)

**Malignant features**

1. Irregular solid tumor
2. Presence of ascites
3. 4 or more papillations
4. Irregular multilocular-solid tumor of 100 mm or more
5. High color Doppler content

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## Application of the Simple rules

**Benign features**

1. V Unilocular cyst
2. Presence of solid components with largest diameter < 7 mm
3. Presence of acoustic shadows
4. Smooth multilocular tumor with largest diameter < 100 mm
5. No blood flow (color score 1)

**Malignant features**

1. Irregular solid tumor
2. Presence of ascites
3. V 4 or more papillations
4. Irregular multilocular-solid tumor of 100 mm or more
5. High color Doppler content

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## How to use Simple rules

**Malignant**: one or more **M**-features present and no **B**-features present

**Benign**: one or more **B**-features are present and no **M**-features present

**Inconclusive (indeterminate, unclassifiable, difficult tumour)**: both **M** AND **B**-features present or no **M** AND **B**-features present

Timmerman D et al. Ultrasound Obstet Gynecol 2008; 31:681-90.
Timmerman D et al. Brit Med J 2010; 341:c6839
Sayasneh A et al. Gynecol Oncol 2013; 130:140-46

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## Can Simple rules be applied to all masses?

Simple ultrasound rules to distinguish between benign and malignant adnexal masses before surgery: prospective validation by IOTA group

Temporal and external validation (n=1938)

- **Simple rules are applicable in 77% of tumors**

When simple rules are applicable

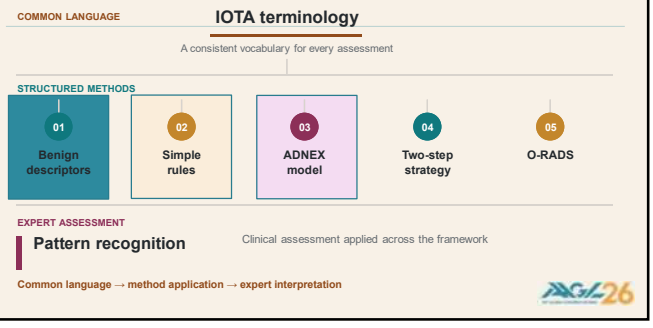
- Sensitivity 92%, specificity 96%
- LR+23, LR- 0.04

When simple rules are not applicable

- Use other method to classify ovarian tumor (subjective assessment of an expert examiner or ADNEX model)

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## A framework for adnexal assessment




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## ADNEX estimates diagnostic outcomes

ADNEX

Estimated diagnostic likelihood

BENIGN

Benign tumor

One benign category

MALIGNANT

Type of malignancy

01 Borderline tumor

02 Stage I invasive tumor

03 Stage II–IV invasive tumor

04 Ovarian metastasis from another primary

Benign or malignant → specific malignant subtype

55

## Adnex model

Benign descriptors and ADNEX in two-step strategy to estimate risk of malignancy in ovarian tumors: retrospective validation in IOTA5 multicenter cohort

ADNEX

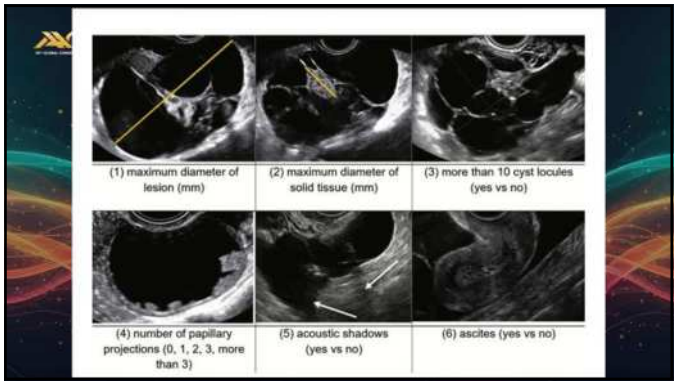
| Variable | Value |
|---|---|
| Maximum diameter of lesion | Value in mm |
| Maximum diameter of largest solid component | Value in mm |
| More than 10 cyst locules? | Yes/no |
| Number of papillary projections | 0, 1, 2, 3 or ≥ 4 |
| Acoustic shadows present? | Yes/no |
| Ascites present? | Yes/no |

*Age, oncology center, Ca-125*

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Van Calster et al, 2015

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## Adnex model

1. Age of the patient at examination (years) 44
2. Oncology center (referral center for gyn-oncol)? no
3. Maximal diameter of the lesion (mm) 200
4. Maximal diameter of the largest solid part (mm) 200
5. More than 10 locules? no
6. Number of papillations (papillary projections) 0
7. Acoustic shadows present? no
8. Ascites (fluid outside pelvis) present? yes
9. Serum CA-125 (U/ml) 692

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## Adnex model

| | |
|---|---|
| Risk of Metastatic Cancer to the Adnexa | 0.6% |
| Risk of stage II-IV Ovarian cancer | 2.5% |
| Risk of stage I Ovarian cancer | 1.9% |
| Risk of Borderline Tumor | 1.8% |
| Risk of Malignancy | 6.8% |
| Chance of Benign Tumor | 93.2% |

READ OF THE RESULTS

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## Adnex model

| | |
|---|---|
| Risk of Metastatic Cancer to the Adnexa | 8.5% |
| Risk of stage II-IV Ovarian cancer | 83.3% |
| Risk of stage I Ovarian cancer | 5.9% |
| Risk of Borderline Tumor | 0.5% |
| Risk of Malignancy | 98.3% |
| Chance of Benign Tumor | 1.7% |

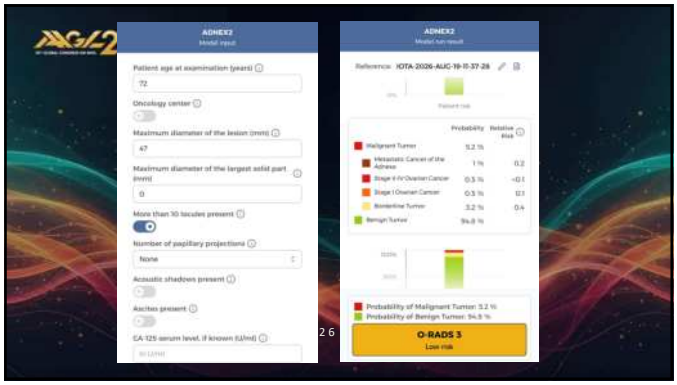
READ OF THE RESULTS

Green points: Baseline Risks

Red points: Patient Risks

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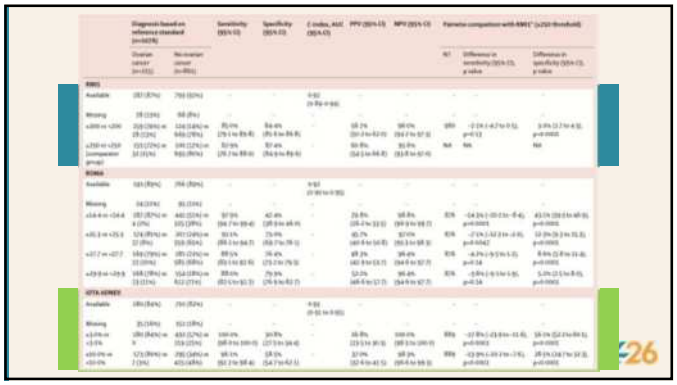
Risk-prediction models in postmenopausal patients with symptoms of suspected ovarian cancer in the UK (ROCkeTS): a multicentre, prospective diagnostic accuracy study

- Postmenopausal patients, 2015-2018
- Non-specific symptoms or elevated Ca-125 OR susp ultrasound finding
- Models tested: RMI1 (200), ROMA, ADNEX 3% and 10%, IOTA simple rules, SR Risk model 3% and 10%, Ca-125 (35)
- 1076/1242 included

- IOTA-ADNEX 10% model – higher sensitivity but lower specificity compared to RMI

Interpretation In view of its higher sensitivity than RMI1 at 250, despite some loss in specificity, we recommend that IOTA ADNEX at 10% should be considered as the new standard-of-care diagnostic in ovarian cancer for postmenopausal patients.

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BMJ Open Head-to-head comparison of the RMI and ADNEX models to estimate the risk of ovarian malignancy: a systematic review and meta-analysis of external validation studies

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## A framework for adnexal assessment

COMMON LANGUAGE

IOTA terminology

A consistent vocabulary for every assessment

STRUCTURED METHODS

01 Benign descriptors
02 Simple rules
03 ADNEX model
04 Two-step strategy
05 O-RADS

EXPERT ASSESSMENT

Pattern recognition

Clinical assessment applied across the framework

Common language → method application → expert interpretation

65

Benign descriptors and ADNEX in two-step strategy to estimate risk of malignancy in ovarian tumors: retrospective validation in IOTA5 multicenter cohort

- To validate two-step strategy
- First apply benign descriptors - applicable in 40% of adnexal masses
- If a benign descriptor can be applied – the mass is almost certainly benign
- If not applicable – use ADNEX model with or without Ca-125

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Table 3 Prevalence of each tumor subtype among masses to which modified benign descriptors (BDs) applied (n = 1798, pooled data)

| Modified BD | n | Tumor subtype | | | | |
|---|---|---|---|---|---|---|
| | | Benign | Borderline | Stage I invasive | Stage II–IV invasive | Secondary metastatic |
| Any | 1798 | 1786.3 (99.3) | 5.0 (0.3) | 1.5 (0.1) | 1.4 (0.1) | 3.6 (0.2) |
| Descriptor 1 | 514 | 511.9 (99.6) | 1.6 (0.3) | 0.3 (0.1) | 0.2 (< 0.1) | 0.1 (< 0.1) |
| Descriptor 2 | 185 | > 184.9 (> 99.9) | < 0.1 (< 0.1) | 0.0 (0) | 0.0 (0) | < 0.1 (< 0.1) |
| Descriptor 3 | 692 | 689.2 (99.6) | 1.3 (0.2) | 0.1 (< 0.1) | 1.2 (0.2) | 0.2 (< 0.1) |
| Descriptor 4 | 407 | 400.2 (98.3) | 2.1 (0.5) | 1.2 (0.3) | 0.2 (0.1) | 3.3 (0.8) |

| Risk threshold | Two-step strategy using ADNEX with CA125 | | Two-step strategy using ADNEX without CA125 | |
|---|---|---|---|---|
| | Sensitivity (95% CI) | Specificity (95% CI) | Sensitivity (95% CI) | Specificity (95% CI) |
| 0.01 | 96.9 (94.1 – 98.4) | 52.5 (45.8 – 59.1) | 96.8 (93.8 – 98.4) | 52.3 (45.9 – 58.8) |
| 0.03 | 93.7 (88.6 – 96.6) | 69.4 (62.4 – 75.6) | 95.2 (91.4 – 97.4) | 66.9 (59.7 – 73.3) |
| 0.05 | 92.9 (87.4 – 96.1) | 78.4 (73.1 – 83.0) | 93.5 (88.2 – 96.6) | 76.0 (70.2 – 81.0) |
| 0.10 | 91.0 (84.5 – 95.0) | 85.6 (81.4 – 89.1) | 91.1 (84.4 – 95.1) | 84.5 (80.1 – 88.1) |
| 0.15 | 87.2 (79.6 – 92.2) | 89.2 (85.4 – 92.1) | 87.7 (80.1 – 92.6) | 88.5 (84.4 – 91.6) |
| 0.20 | 83.4 (74.3 – 89.7) | 91.6 (88.3 – 94.0) | 83.3 (75.0 – 89.3) | 90.3 (87.0 – 92.9) |
| 0.25 | 80.2 (71.6 – 86.7) | 93.2 (90.2 – 95.3) | 79.8 (70.2 – 86.9) | 92.1 (88.9 – 94.4) |
| 0.30 | 77.3 (67.9 – 84.5) | 94.5 (91.7 – 96.4) | 77.9 (68.4 – 85.2) | 93.2 (90.2 – 95.3) |
| 0.40 | 73.0 (63.4 – 80.8) | 95.8 (93.4 – 97.3) | 72.8 (63.0 – 80.8) | 95.0 (92.4 – 96.8) |
| 0.50 | 66.7 (57.0 – 75.1) | 97.1 (95.5 – 98.1) | 66.8 (55.8 – 76.2) | 96.3 (94.1 – 97.6) |

ADNEX without Ca-125

AUC 0.94 (95%CI 0.92-0.96)

ADNEX with Ca-125

AUC 0.95 (95%CI 0.92-0.96)

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| Risk threshold | Two-step strategy using ADNEX with CA125 | | Two-step strategy using ADNEX without CA125 | |
|---|---|---|---|---|
| | Sensitivity (95% CI) | Specificity (95% CI) | Sensitivity (95% CI) | Specificity (95% CI) |
| | Premenopausal patients (n=2754) | | Premenopausal patients (n=2754) | |
| 0.01 | 95.1 (89.2 – 97.9) | 60.0 (54.1 – 65.6) | 94.8 (88.2 – 97.8) | 59.9 (54.3 – 65.4) |
| 0.03 | 90.0 (82.8 – 94.4) | 76.2 (69.9 – 81.6) | 92.0 (86.0 – 95.6) | 75.2 (68.3 – 80.9) |
| 0.05 | 89.0 (81.4 – 93.8) | 83.7 (79.2 – 87.3) | 89.8 (82.3 – 94.4) | 83.0 (78.5 – 86.7) |
| 0.10 | 86.9 (78.4 – 92.4) | 89.4 (86.0 – 92.1) | 87.5 (79.3 – 92.8) | 88.7 (85.1 – 91.5) |
| 0.15 | 81.8 (72.9 – 88.3) | 92.0 (88.6 – 94.4) | 83.4 (75.3 – 89.3) | 91.7 (88.5 – 94.0) |
| 0.20 | 75.8 (65.2 – 84.0) | 94.0 (90.9 – 96.0) | 79.3 (67.6 – 83.3) | 93.1 (90.1 – 95.3) |
| 0.25 | 71.0 (62.1 – 78.6) | 95.2 (92.3 – 97.0) | 71.7 (61.0 – 80.4) | 94.4 (91.5 – 96.4) |
| 0.30 | 67.9 (58.3 – 76.1) | 96.2 (93.5 – 97.8) | 67.0 (55.7 – 76.7) | 95.1 (92.2 – 96.9) |
| 0.40 | 62.5 (53.5 – 70.7) | 96.9 (94.7 – 98.2) | 61.7 (50.7 – 71.6) | 96.3 (93.7 – 97.9) |
| 0.50 | 54.1 (44.1 – 63.8) | 97.8 (96.3 – 98.7) | 53.7 (42.8 – 64.2) | 97.5 (95.6 – 98.6) |
| | Postmenopausal patients (n=2151) | | Postmenopausal patients (n=2151) | |
| 0.01 | 97.4 (94.7 – 98.8) | 40.2 (33.7 – 46.9) | 96.6 (93.7 – 98.2) | 39.5 (33.3 – 46.2) |
| 0.03 | 95.1 (90.3 – 97.5) | 57.7 (50.1 – 64.9) | 95.2 (91.1 – 97.5) | 53.1 (45.9 – 60.2) |
| 0.05 | 93.5 (87.8 – 96.6) | 68.4 (61.8 – 74.3) | 94.1 (88.8 – 97.0) | 63.5 (56.4 – 70.0) |
| 0.10 | 92.0 (84.8 – 96.0) | 78.0 (72.0 – 83.0) | 92.7 (85.6 – 96.5) | 76.7 (70.2 – 82.2) |
| 0.15 | 90.3 (82.3 – 94.9) | 83.6 (78.1 – 88.0) | 90.6 (82.6 – 95.2) | 82.1 (75.6 – 87.1) |
| 0.20 | 87.8 (78.6 – 93.4) | 86.8 (82.3 – 90.3) | 89.1 (80.9 – 94.1) | 84.8 (79.9 – 88.7) |
| 0.25 | 86.5 (77.3 – 92.3) | 88.8 (84.9 – 91.8) | 85.9 (76.5 – 92.0) | 87.3 (82.8 – 90.7) |
| 0.30 | 83.9 (73.4 – 90.7) | 90.5 (86.7 – 93.3) | 85.1 (76.0 – 91.2) | 89.1 (84.7 – 92.3) |
| 0.40 | 81.2 (70.6 – 88.6) | 92.7 (89.6 – 94.9) | 81.1 (71.6 – 88.0) | 91.4 (87.6 – 94.1) |
| 0.50 | 76.5 (66.2 – 84.4) | 94.8 (92.5 – 96.5) | 77.1 (65.8 – 85.5) | 93.1 (89.7 – 95.5) |

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## Two-step strategy -

- ✓ Large proportion of adnexal masses can be classified as benign using benign descriptors.
- ✓ For the remaining masses – ADNEX model can be used to estimate the risk of malignancy

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## A framework for adnexal assessment

COMMON LANGUAGE

**IOTA terminology**

A consistent vocabulary for every assessment

STRUCTURED METHODS

01 Benign descriptors

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05 O-RADS

EXPERT ASSESSMENT

**Pattern recognition**

Clinical assessment applied across the framework

Common language → method application → expert interpretation

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## O-RADS

The Ovarian-Adnexal Reporting and Data System

O-RADS US Risk Stratification and Management System: A Consensus Guideline from the ACR Ovarian-Adnexal Reporting and Data System Committee

O-RADS categories 0-5

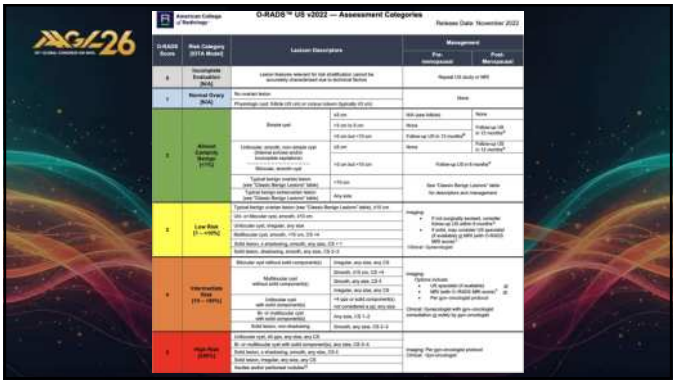
Provides clinical interpretation of ultrasound findings and results

Decreases ambiguity in US reports – higher accuracy in asigning risk of malignancy

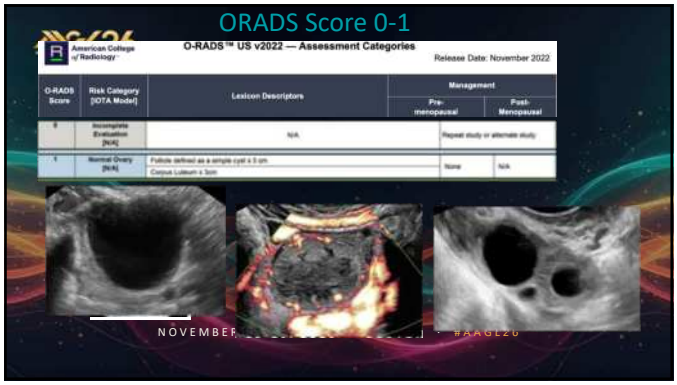
Provides management recommendation for each category of malignancy risk

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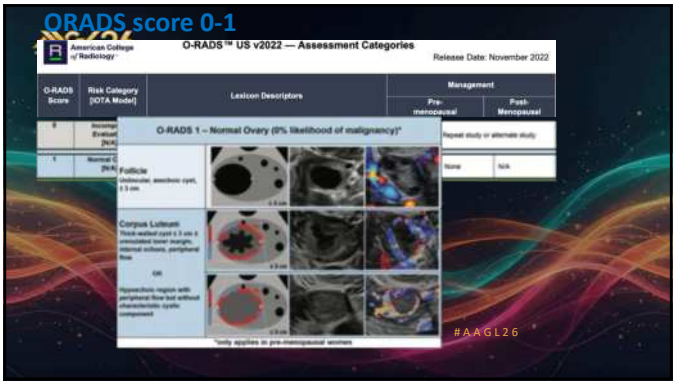
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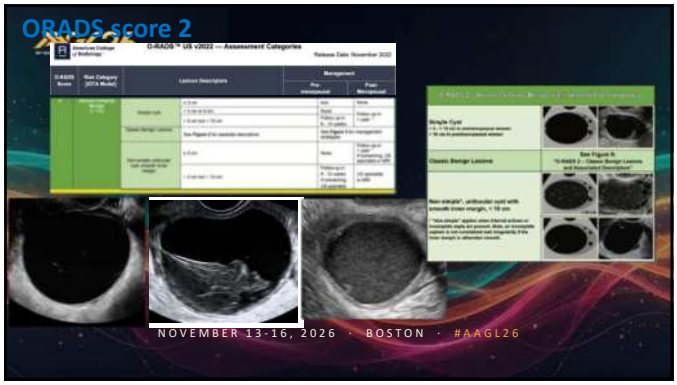

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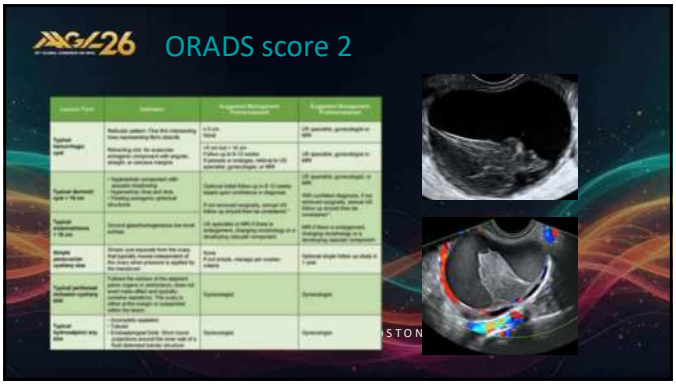

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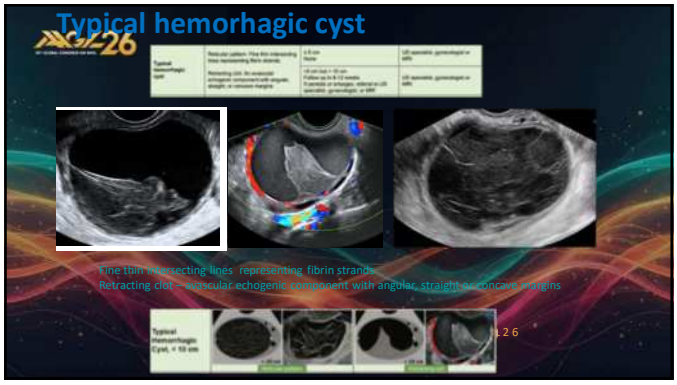

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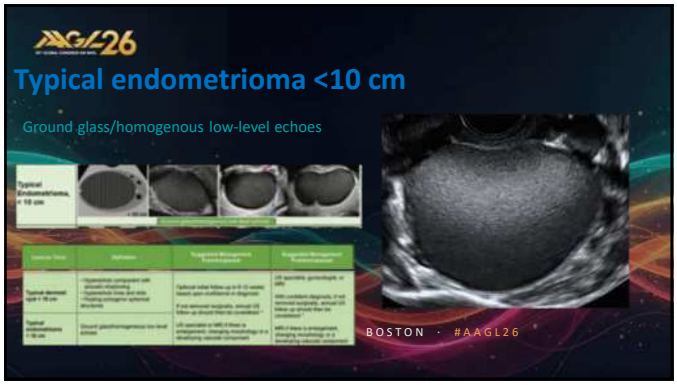

76



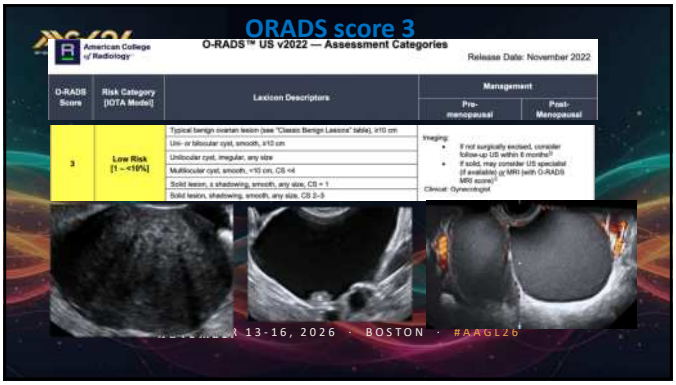

77



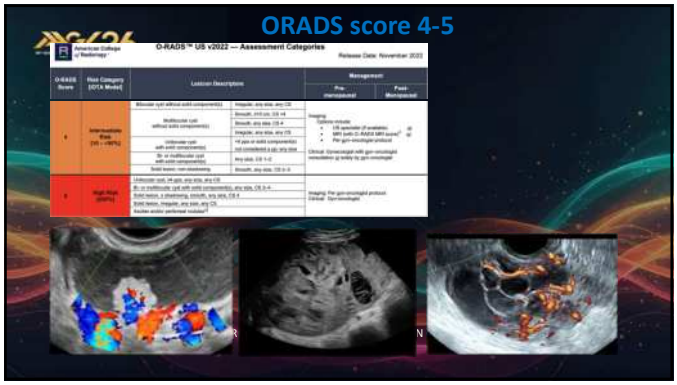

78



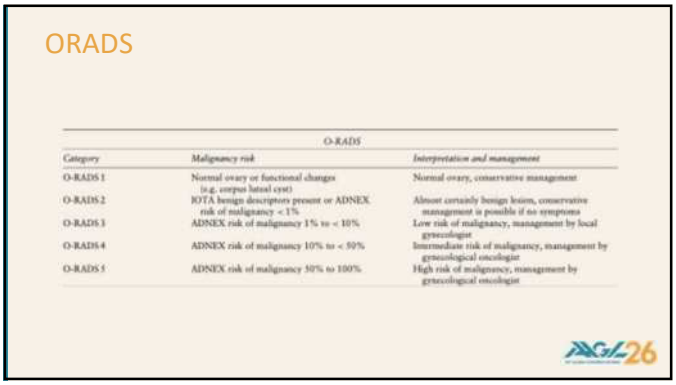

79



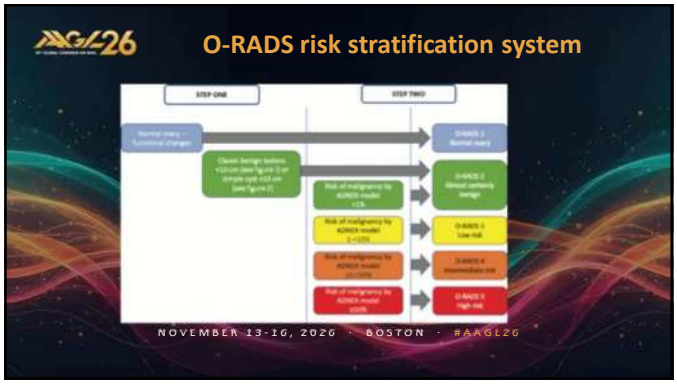

80



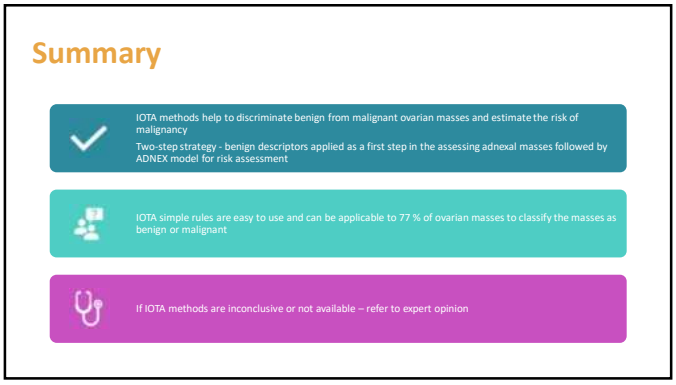

81



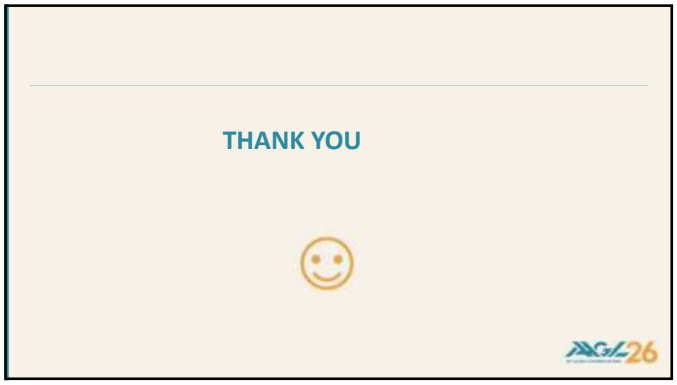

82




83




84



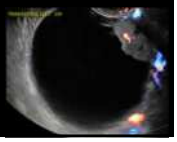

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Stanford MEDICINE Radiology

# O-RADS primer



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Associate Professor
Body Imaging and MRI
Department of Radiology
Stanford University



1

## Disclosures

- None

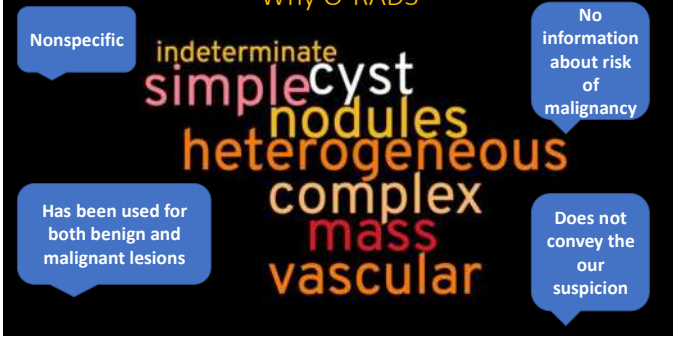
2

## Teaching points

- Tip 1: Pattern based approach to ovarian lesions
- Tip 2: Learn the applicability criteria; Familiarize with most frequently utilized O-RADS US and MRI lexicon
- Tip 3: Keep the chart and O-RADS app handy for every day clinical applications

3

## Why O-RADS



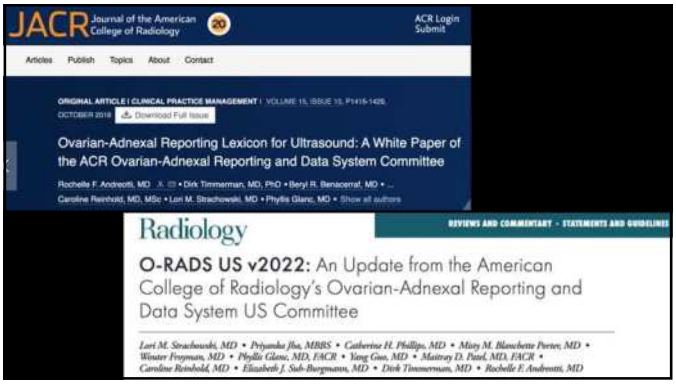

4

## Why O-RADS

Absolutely benign ← Indeterminate → Absolutely malignant

- Provides evidence based risk stratification (what is the risk of malignancy?)
- What to do next? Management strategies
  - Further imaging
  - Gynecology vs gynecology oncology consultation
- Goals: Prevent surgery for benign lesions
  - Improved outcomes for patients with ovarian cancer when initial surgery done by gynecology oncologist

5




6

## When does O-RADS apply?

- O-RADS Ultrasound (US) applies to the ovaries!
- Lesions involving (or suspected to involve)
  - Ovaries
  - Fallopian tubes
  - Paraovarian cysts
- Intent is to stratify risk of malignancy

7

## When O-RADS is not applicable!

- When an "adnexal finding" is related to:
  - Pelvic inflammatory disease
  - Ectopic pregnancy
  - Torsion of a normal ovary
- Lesions clearly identified as non-ovarian/non-tubal in origin
  - e.g. an exophytic or broad ligament myoma

8

## When does O-RADS apply?

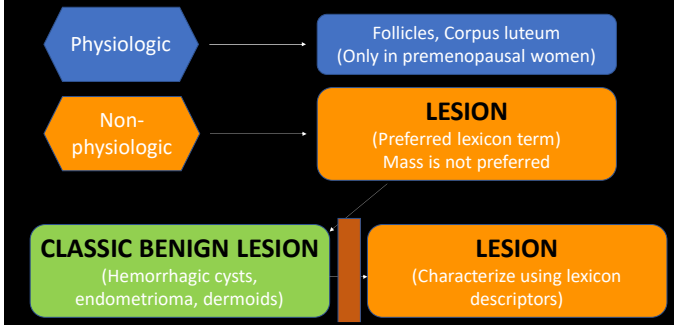
- MYTH: O-RADS does not apply in an acute setting
- REALITY: O-RADS applies as long as there is a lesion
  - Intent is to stratify risk of malignancy
- Management guided by patient symptoms
- Scenarios:
  - Torsion of an ovary with a dermoid→ Score dermoid, manage torsion
  - Endometrioma and deep endometriosis→ Score endometrioma, manage per patient symptoms

9

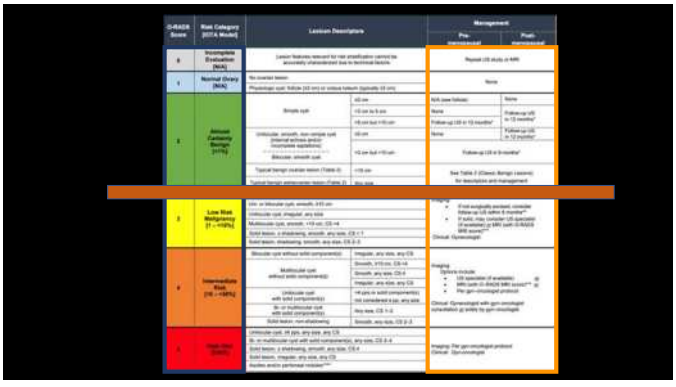
## O-RADS US Lexicon

10

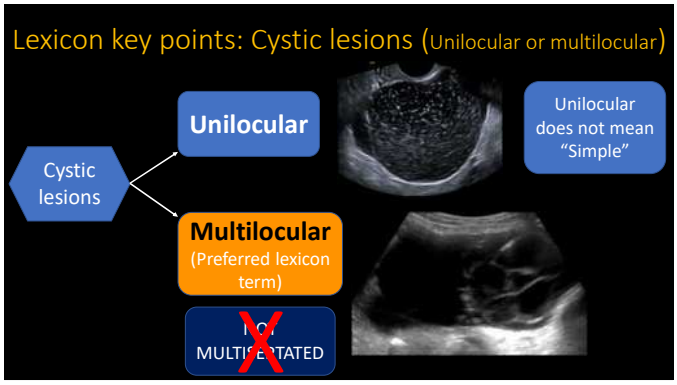
## Lexicon key points



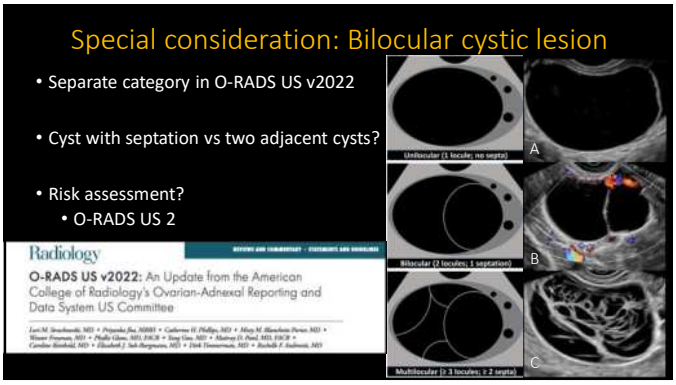

11



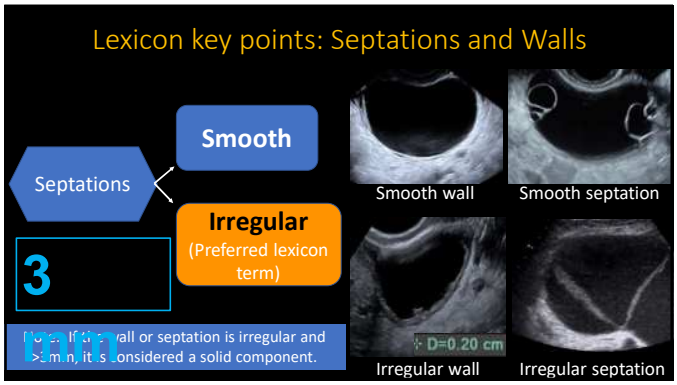
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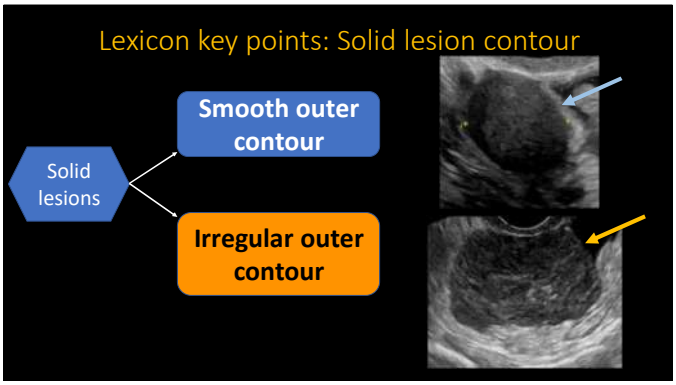

13



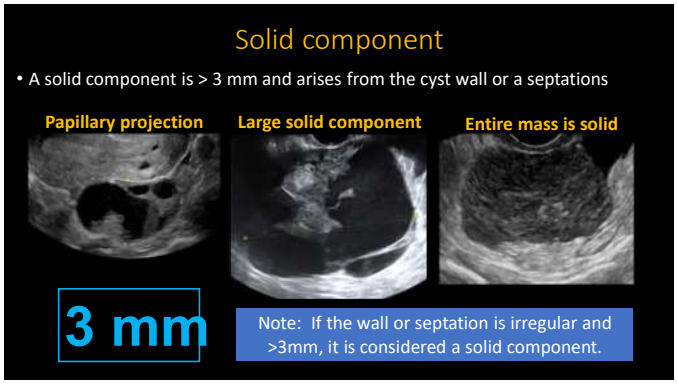

14



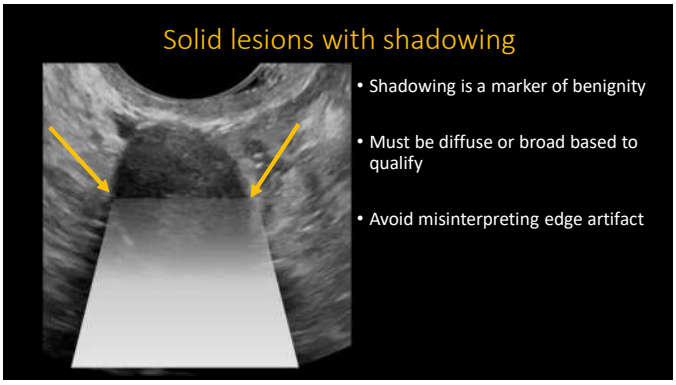

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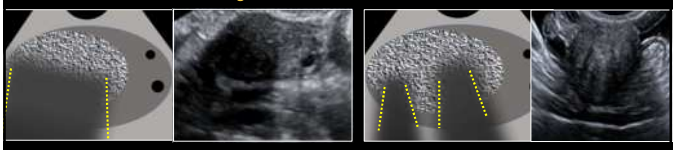



18

## Shadowing

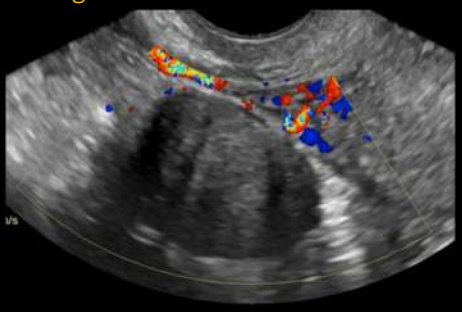
Diffuse shadowing

Broad shadowing



19

## Shadowing is best demonstrated on cine clips



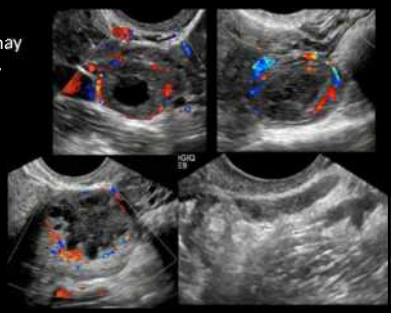
20

# Let's look at some examples

21

## Physiologic/Normal ovary: Corpus luteum lexicon

- Corpus luteum < 3cm
- Thick walled cyst ≤ 3 cm that may have crenulated inner margins, internal echoes and intense peripheral color Doppler flow

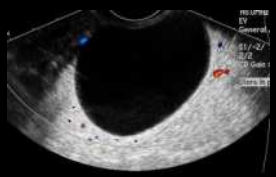


22

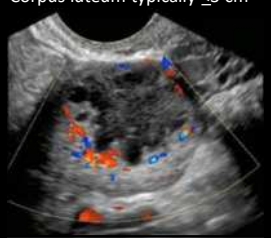
## O-RADS US 1

| | | | |
|---|---|---|---|
| 1 | Normal Ovary [N/A] | No ovarian lesion | None |
| | | Physiologic cyst: follicle (≤3 cm) or corpus luteum (typically ≤3 cm) | |

Follicle= Simple cyst ≤3 cm



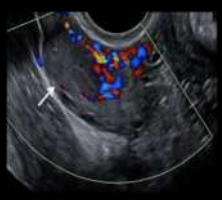
Corpus luteum typically ≤3 cm



23

## Pitfall: Solid appearing corpus luteum

- Can sometimes appear as a hypoechoic region in the ovary
- No characteristic cystic component
- Peripheral vascularity helps differentiate
- Solid masses should have central flow



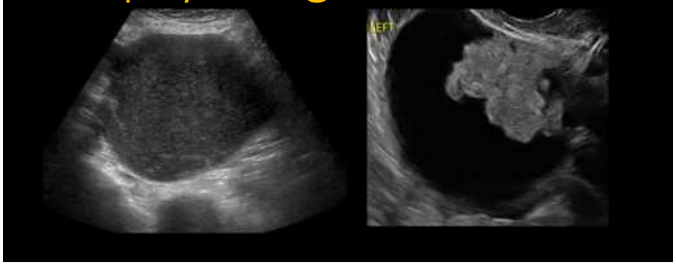
24

# Physiologic findings in premenopausal patients



25

# Lesion
# Non physiologic observations



26

## O-RADS US 2

| | | | Size | Pre-meno | Post-meno |
|---|---|---|---|---|---|
| 2 | Almost Certainly Benign [<1%] | Simple cyst | ≤3 cm | N/A (see follicle) | None |
| | | | >3 cm to 5 cm | None | Follow-up US in 12 months* |
| | | | >5 cm but <10 cm | Follow-up US in 12 months* | |
| | | Unilocular, smooth, non-simple cyst (internal echoes and/or incomplete septations) | ≤3 cm | None | Follow-up US in 12 months* |
| | | Bilocular, smooth cyst | >3 cm but <10 cm | Follow-up US in 6 months* | |
| | | Typical benign ovarian lesion (Table 2) | <10 cm | See Table 2 (Classic Benign Lesions) for descriptors and management | |
| | | Typical benign extraovarian lesion (Table 2) | Any size | | |

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# Pattern recognition in O-RADS

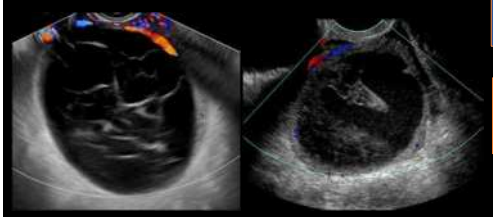



28

# Lexicon key terms: Classic benign lesions
## Hemorrhagic cyst descriptors

Reticular pattern

Retracting clot



Straight and concave margins

Color Doppler: No flow in clot + Peripheral flow

29

# Lexicon key terms: Classic benign lesions
## Dermoid descriptors

Acoustic shadowing from a hyperechoic component

Hyperechoic lines and dots

Floating hyperechoic spherical structures

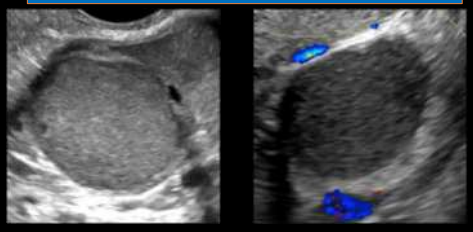


"Dermoid Mesh" and "Dot-dash" may be in common usage in some locations, but are not preferred descriptors in this lexicon

30

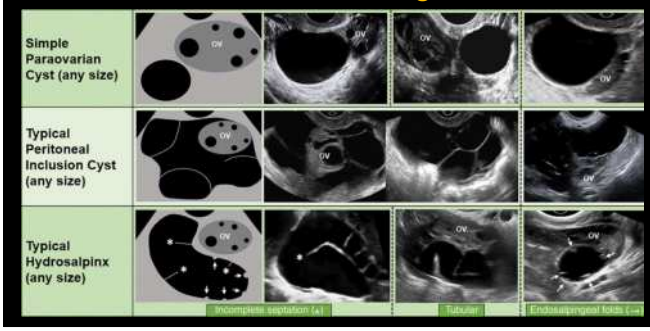
## Lexicon key terms: Classic benign lesions
## Endometrioma descriptors

Ground glass echoes, homogeneous low level echoes



31

## O-RADS 2: Classic benign lesions




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## Beyond O-RADS 2

- Anything else that we have not discussed so far is described as

**Lesion**

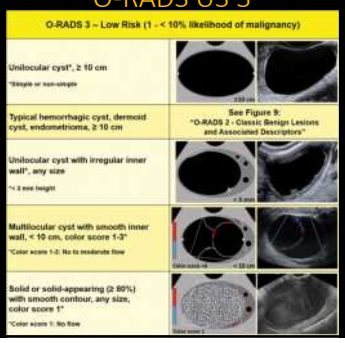
33

## O-RADS US 3

| | | | |
|---|---|---|---|
| 3 | Low Risk Malignancy [1 – <10%] | Typical benign ovarian lesion (Table 2), ≥10 cm<br>Uni- or bilocular cyst, smooth, ≥10 cm<br>Unilocular cyst, irregular, any size<br>Multilocular cyst, smooth, <10 cm, CS <4<br>Solid lesion, ± shadowing, smooth, any size, CS = 1<br>Solid lesion, shadowing, smooth, any size, CS 2–3 | Imaging:<br>• If not surgically excised, consider follow-up US within 6 months**<br>• If solid, may consider US specialist (if available) or MRI (with O-RADS MRI score)***<br>Clinical: Gynecologist |

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## O-RADS US 3



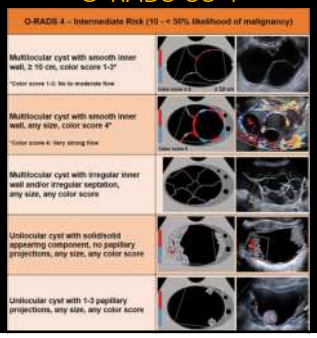

35

## O-RADS US 4

| | | | | |
|---|---|---|---|---|
| 4 | Intermediate Risk [10 – <50%] | Bilocular cyst without solid component(s) | Irregular, any size, any CS | Imaging:<br>Options include:<br>• US specialist (if available) or<br>• MRI (with O-RADS MRI score)*** or<br>• Per gyn-oncologist protocol<br>Clinical: Gynecologist with gyn-oncologist consultation or solely by gyn-oncologist |
| | | Multilocular cyst without solid component(s) | Smooth, ≥10 cm, CS <4 | |
| | | | Smooth, any size, CS 4 | |
| | | | Irregular, any size, any CS | |
| | | Unilocular cyst with solid component(s) | <4 pps or solid component(s) not considered a pp; any size | |
| | | Bi- or multilocular cyst with solid component(s) | Any size, CS 1–2 | |
| | | Solid lesion, non-shadowing | Smooth, any size, CS 2–3 | |

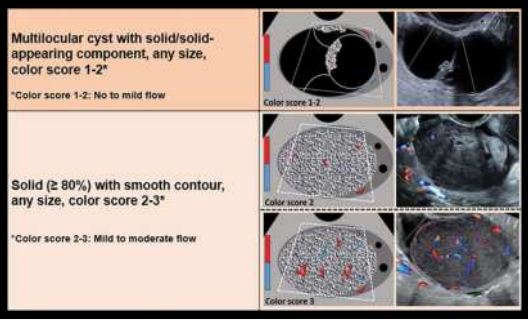
36

## O-RADS US 4




37

## O-RADS US 4



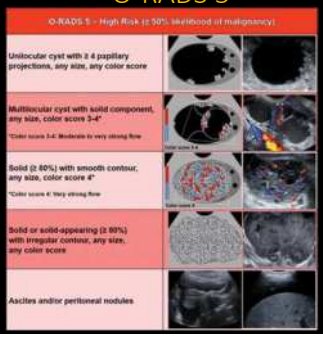

38

## O-RADS US 5

| | | | |
|---|---|---|---|
| 5 | High Risk (≥50%) | Unilocular cyst, ≥4 pps, any size, any CS | Imaging: Per gyn-oncologist protocol<br>Clinical: Gyn-oncologist |
| | | Bi- or multilocular cyst with solid component(s), any size, CS 3-4 | |
| | | Solid lesion, ± shadowing, smooth, any size, CS 4 | |
| | | Solid lesion, irregular, any size, any CS | |
| | | Ascites and/or peritoneal nodules**** | |

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## O-RADS 5




40

## Practical tips: Every day clinical use

- Keep the O-RADS chart handy
- ACR O-RADS app (iPhone and android)
- Step-by-step lesion characterization (examples included)
- Header helpful for dictating using lexicon terms
- Management recommendations provided



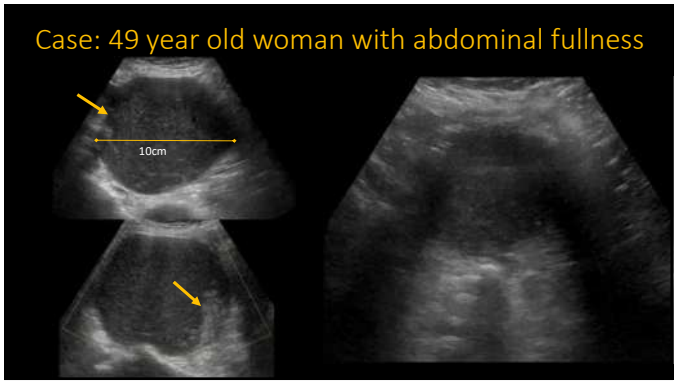

41

## Case: 46-year-old female with right ovarian mass



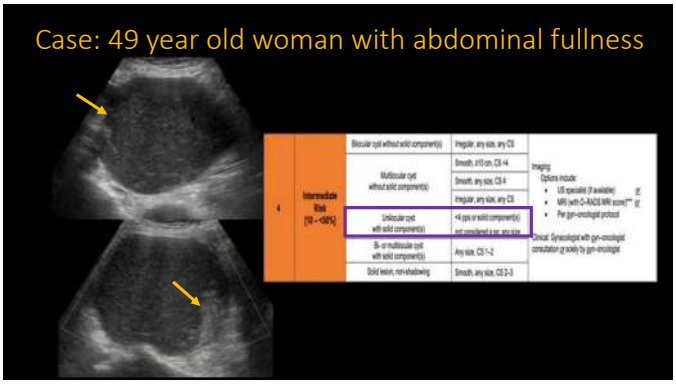

42

## Case: 49 year old woman with abdominal fullness



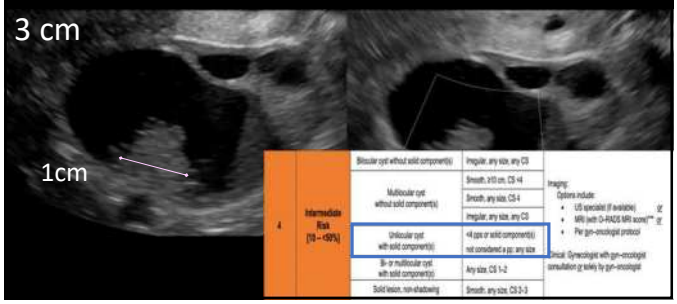

43

## Case: 49 year old woman with abdominal fullness



44

## Case: 37-year-old female patient; history of borderline tumor




45

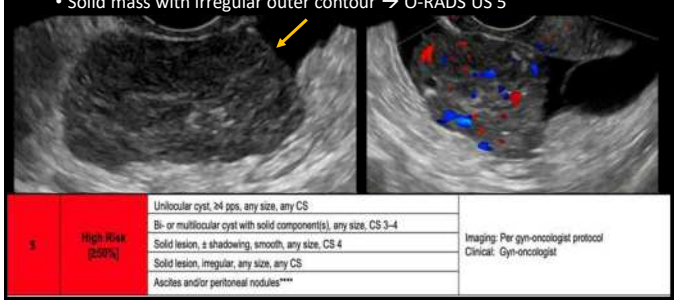
## Case: 78-year-old patient with postmenopausal bleeding and pain




46

## Case: 65 year old patient with abdominal fullness

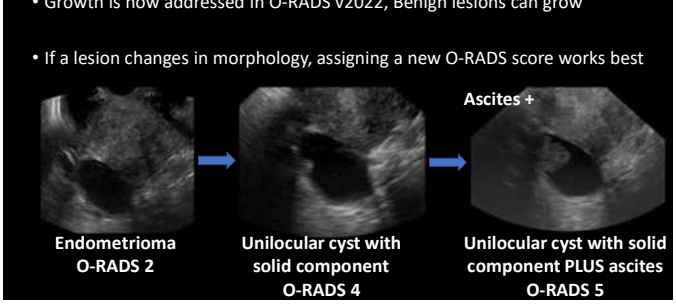
- Solid mass with irregular outer contour → O-RADS US 5




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## Addressing growth and change in morphology

- Growth is now addressed in O-RADS v2022, Benign lesions can grow
- If a lesion changes in morphology, assigning a new O-RADS score works best




48

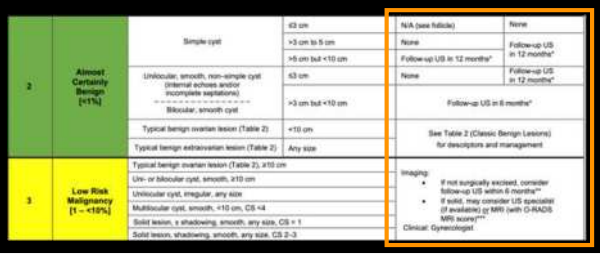
## Documenting size

- Three dimensional measurements recommended
- Longest dimension is used for risk stratification (10 cm cutoff)
- Average dimension used to assess growth
- Probe pressure can compress lesions

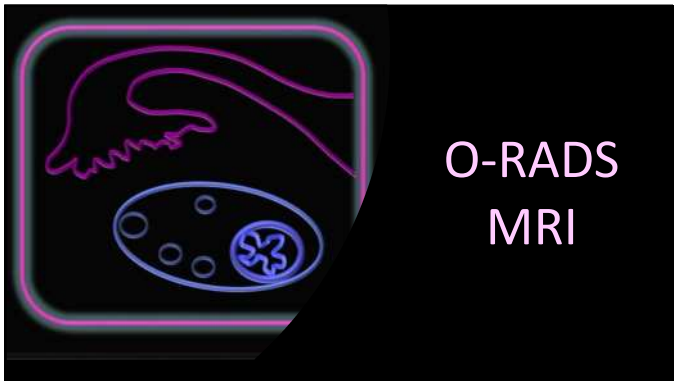
49

## How long do we follow-up?

- Based on score: 12 months and some 6 months
- Duration: (6 months), 12 months and 24 months



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# O-RADS MRI

51

## O-RADS MRI risk stratification table



52

## When and why?

- Most of the masses will be initially seen on pelvic US or CT
- Before O-RADS, ~20-25% of adnexal masses remain indeterminate after initial US
- Size: Larger lesions have limitations of complete evaluation with ultrasound
- Variable PPV for the detection of ovarian cancer using US
  - Low PPV in general population with low incidence of ovarian cancer

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## Enhanced sensitivity and specificity with MRI

- MRI problem solving tool for definitive characterization
- High sensitivity and specificity for both benign and malignant lesions
- ACR O-RADS MRI developed an evidence-based lexicon and risk stratification system
  - Employed the AdnexMR score as the basis for the lexicon




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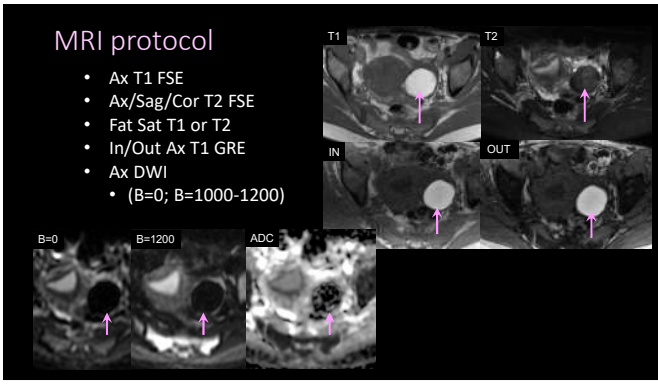
## Comparing O-RADS US and O-RADS MRI




55

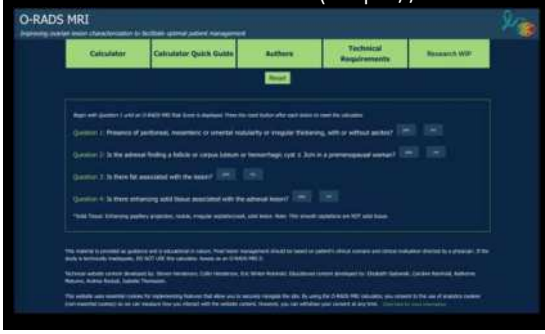
## MRI protocol

- Ax T1 FSE
- Ax/Sag/Cor T2 FSE
- Fat Sat T1 or T2
- In/Out Ax T1 GRE
- Ax DWI
  - (B=0; B=1000-1200)




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## O-RADS MRI calculator (https://oradsmricalc.com)




57

## Case: 69 year old patient, bilateral adnexal masses

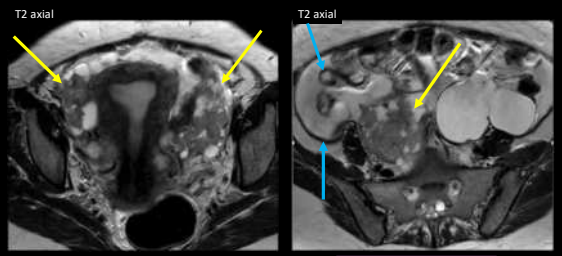



- Solid bilateral masses
- Peritoneal disease, Ascites

O-RADS MRI 5

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## Case: 69 year old patient, bilateral adnexal masses




- Solid bilateral masses
- Peritoneal disease, Ascites

O-RADS MRI 5

59

## Did MRI really add value?

60

## What allows higher specificity for MRI?

BENIGN MARKERS

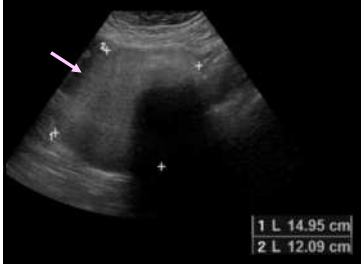
- Additional tissue identification advantage
  - Fat detection- microscopic and macroscopic
  - Fibrous tissue
- Spatial orientation capability
  - Pedunculated myomas

MALIGNANT MARKERS

- Ability to identify enhancing soft tissue

61

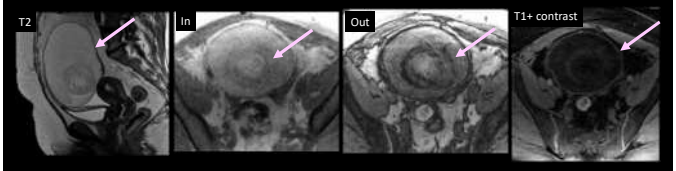
## 39 year old woman with pelvic pain for 1 year




**O-RADS US 3**

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## MR Imaging




- T2 Hyperintense signal= ? Fat or fluid contents
- In and out of phase imaging
- Signal drop out on out of phase = Lipid containing mass
- Mild expected enhancement

**O-RADS 2**

**Mature cystic teratoma**

63

## What allows higher specificity for MRI?

BENIGN MARKERS

- Additional tissue identification advantage
  - Fat detection- microscopic and macroscopic
  - Fibrous tissue
- Spatial orientation capability
  - Pedunculated myomas

MALIGNANT MARKERS

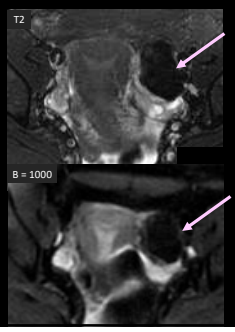
- Ability to identify enhancing soft tissue

64

## Benign lesions: O-RADS MRI 2

- Simple cyst
- Hemorrhagic cyst
- Endometrioma
- Dermoid
- Dark T2/Dark DWI lesion

Management by gynecologist

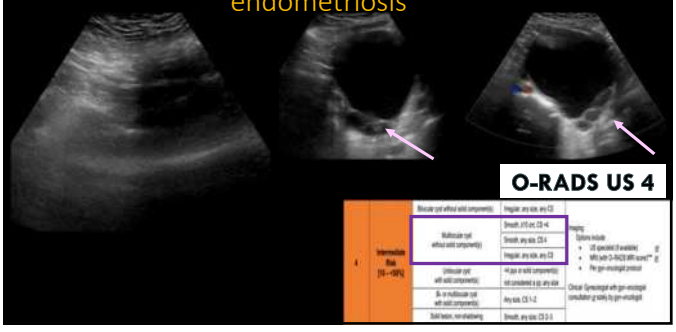



**O-RADS 2**

**Fibroma**

65

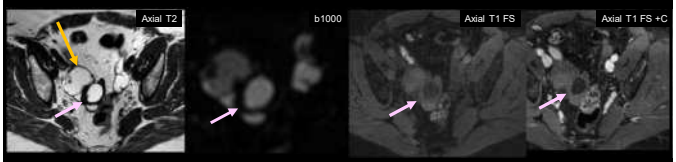
## 53 year old woman with concern for endometriosis



**O-RADS US 4**

66

## MR imaging




- Presence of T2 dark and diffusion dark signal is very rea
- Most suggestive of fibrous tissue
- Mild enhancement is expected and should not be a cause of alarm

**O-RADS MRI 2**

**Serous cystadenofibroma**

67

## What allows higher specificity for MRI?

BENIGN MARKERS

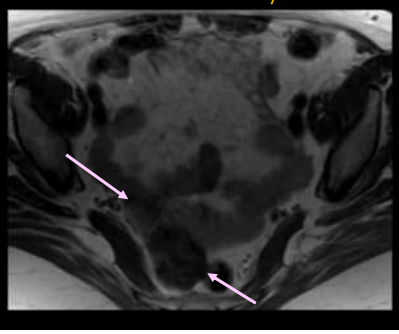
- Additional tissue identification advantage
  - Fat detection- microscopic and macroscopic
  - Fibrous tissue
- Spatial orientation capability
  - Pedunculated myomas

MALIGNANT MARKERS

- Ability to identify enhancing soft tissue

68

## Pedunculated myoma



69

## What allows higher specificity for MRI?

BENIGN MARKERS

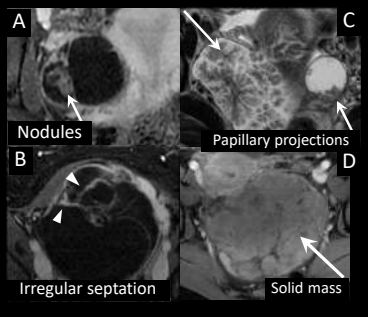
- Additional tissue identification advantage
  - Fat detection- microscopic and macroscopic
  - Fibrous tissue
- Spatial orientation capability
  - Pedunculated myomas

MALIGNANT MARKERS

- Ability to identify enhancing soft tissue

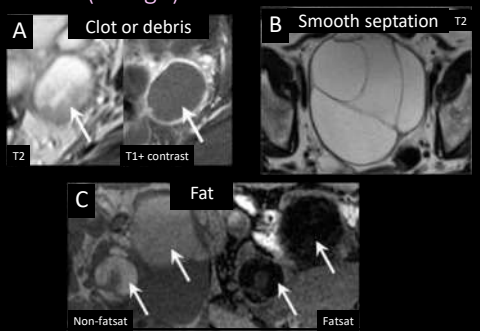
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## Solid tissue (Benign or Malignant)?

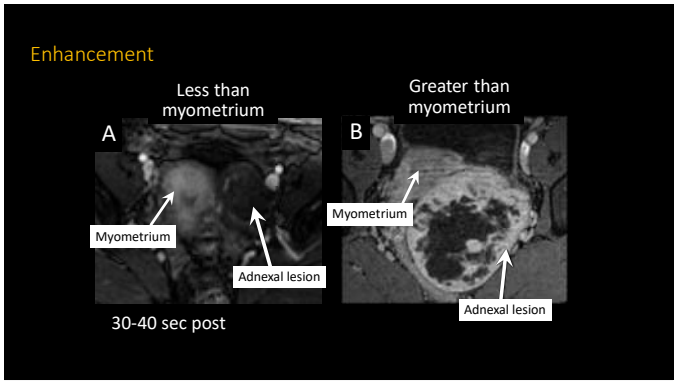



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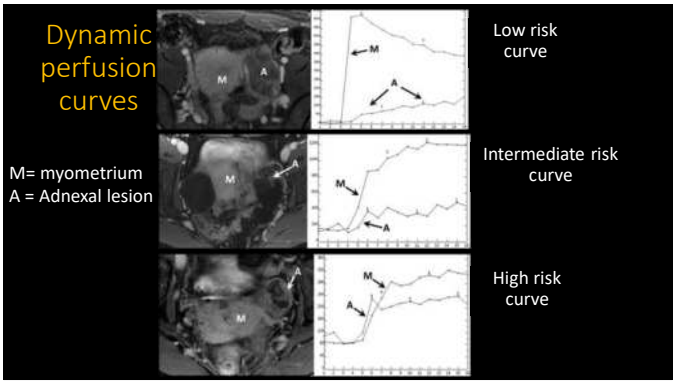
## Not Solid tissue (Benign)



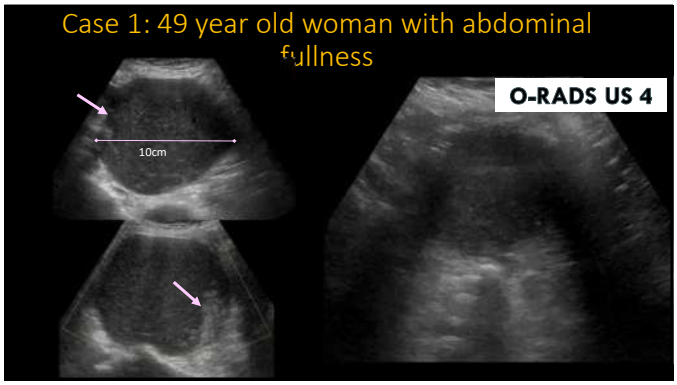

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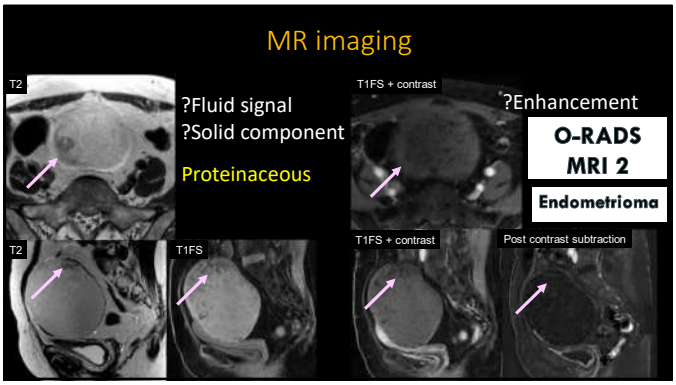

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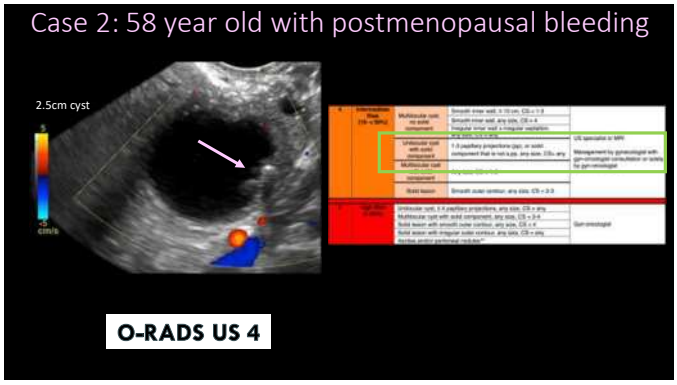

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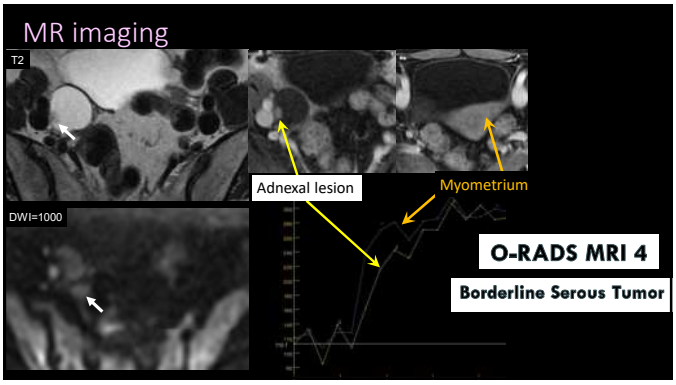

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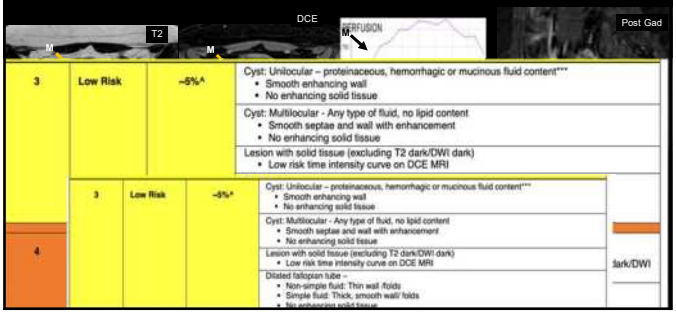



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## Case 3: 39 year old patient, cystic ovarian lesion + mural nodule




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## My patient can not get contrast- can we still do an MRI?

- Absolutely yes!!
- May not be able to give an O-RADS score or differentiate between certain subcategories
- Available information can be very helpful for "triaging" the mass into broadly benign or malignant categories

80

## My patient can not get contrast- can we still do an MRI?

**Non-contrast MRI can accurately characterize adnexal masses: a retrospective study**

Hilal Sahin [1 2], Camilla Panico [3], Stephan Ursprung [4 5], Vittorio Simeon [6], Paolo Chiodini [6], Amy Frary [7], Bruno Carmo [7], Janette Smith [7], Sue Freeman [7], Mercedes Jimenez-Linan [8], Helen Bolton [9 10], Krishnayan Haldar [9], Joo Ern Ang [11], Caroline Reinhold [12 13], Evis Sala [4 5], Helen Addley [4 5 7]

**Key points:** • A non-contrast pelvic MRI protocol may allow the characterization of adnexal masses with high accuracy. • The non-contrast MRI score may be used in clinical practice for differentiating benign from malignant adnexal lesions when the lack of intravenous contrast medium precludes analysis with the O-RADS MRI score.

81

## Teaching points

- O-RADS: helpful lesion stratification
- Avoid using ambiguous terms: complex, heterogeneous
- Using lexicon descriptors for classic benign lesions prevents false alarm
- Converse is true for higher risk lesions: Gynecology Oncology referrals
- Management recommendations based on risk score (*and patient symptoms!)*

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## Thank you for your attention!

jhap@stanford.edu



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# Artificial Intelligence in Adnexal Mass Assessment

What Can AI Add to Current Diagnostic Tools?

Afshin FAZEL, MD, PhD
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NOVEMBER 13-16, 2026 · BOSTON · #AAGL26

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## Disclosure



Hôpital Lariboisière AP-HP

- "I have no financial relationships to disclose with this presentation"

Deputy Editor of JMIG



Judicial Expert Paris Court of Appeal

ENDOSEARCH

2

- Vidéo case report

3

- MRI CASE REPORT

4

## Learning Objectives

- • Compare AI with expert ultrasound, IOTA ADNEX, and O-RADS.
- • Critique diagnostic accuracy, external validation, and bias.
- • Identify practical uses for triage, MRI problem-solving, and surgical planning.

5

## The Diagnostic Baseline: Where We Stand Today

- **Expert Transvaginal Ultrasound** (TVUS): Remains the crucial clinical benchmark for mass evaluation.
- **Risk Stratification Systems: IOTA** Simple Rules and ADNEX provide standardized descriptors and risk estimation. O-RADS US translates morphology and Doppler findings into management pathways.
- **MRI & Biomarkers**: Complement rather than replace appropriate ultrasound assessment.
- **Clinical Limitations:** Qualitative descriptors introduce inter-observer variability, and expert sonography is scarce outside tertiary centers.

1 TVUS
IOTA · O-RADS US

↓

2 MRI
Indeterminate lesions

↓

3 Management
Clinical context + biomarkers

6

## Statistical Risk Models vs. Image-Based Deep Learning

- **IOTA-ADNEX** is NOT Deep Learning: It is an interpretable, multivariable statistical prediction model using clinical and ultrasound variables.
- **Modern Image AI:** Learns features directly from raw image pixels to automate segmentation and classification.
- **Taxonomy of AI Methods**: Includes structured machine learning, radiomics (texture/shape analysis), deep learning (CNNs/transformers), and multimodal models.
- **Fair Comparison**: AI must be benchmarked against established clinical pathways (such as IOTA-ADNEX or expert subjective evaluation), not against no assessment.

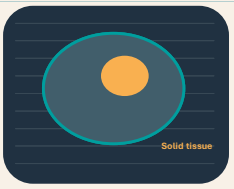
| STATISTICAL MODEL | IMAGE-BASED AI |
|---|---|
| IOTA ADNEX | CNNs / Transformers |
| Clinician-entered variables | Pixel-derived features |
| Interpretable risk estimate | Segmentation + classification |

**Compare against expert US and validated pathways**

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## Enhancing Ultrasound: Automation & Decision Support

- **Automated Segmentation:** Multi-task deep neural networks delineate internal lesion components (solid tissue, papillary projections) without manual annotations.
- **Elevating Non-Experts**: Deep learning decision support significantly improves junior reader diagnostic accuracy and inter-observer agreement.
- **Clinical-OMTA Performance**: Elevated junior radiologist accuracy from 72.3% to 88.0% and matched expert subjective assessment (AUC 0.930 to 0.950).
- **Workflow Benefits**: Offers reproducible documentation and scalable quality assurance.

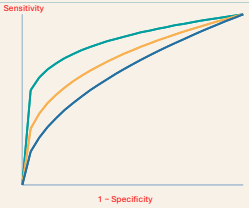



AI ROI CONTOUR

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## Diagnostic Performance: AI Models vs. Clinicians

- **International Multicenter Validation:** Transformer-based evaluation across 17,119 ultrasound images from 3,652 patients across 20 centers in 8 countries.
- **O-RADS 4 Focus:** In intermediate-risk O-RADS 4 lesions, deep learning models achieved an AUC of 0.95 (though in a test cohort of 47 patients out of 519).
- **Diagnostic Curves:** Clinical-OMTA reached an AUC of 0.950 for distinguishing benign, borderline, and malignant tumors.




Schematic ROC curves — not digitized study data

International Multicenter Study (2024). Transformer-based ultrasound detection across 20 centers. PMID: 39747679. | Dai W-L et al. (2024). Ultrasound deep-learning pipeline for ovarian masses. eClinicalMedicine, 78:102923. PMID: 39640935. | O-RADS 4 Multicenter DL Study (2024). Deep learning evaluation in O-RADS [illegible] masses. PMID: 38981916.

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## Refining Indeterminate Lesions on MRI

- **O-RADS MRI Benchmark**: Standardized 5-category risk system with high specificity (90% to 95%) for problem-solving.
- **Scoring Ambiguity**: Inter-reader agreement drops to moderate levels in intermediate/high-risk categories (kappa 0.669 for O-RADS 4; 0.709 for O-RADS 5).
- **Radiomics Resolution**: Machine learning applied to dynamic contrast-enhanced and T2-weighted MRI radiomics resolves scoring ambiguity with an AUC of 0.948.
- **Automated Processing**: AI automates lesion and solid-tissue segmentation across multiparametric MRI sequences.

Indeterminate US
O-RADS 4 / equivocal

↓

O-RADS MRI
Specificity 90–95%

↓

Selective radiomics
AUC 0.948 reported

Thomassin-Naggara I et al. (2020). O-RADS MRI Risk Stratification System Assessment in 1,340 Women. JAMA Netw Open, 3:e1919896. | Thomassin-Naggara I et al. (2022). Artificial intelligence applications in ovarian lesion MRI. J Magn Reson Imaging, 56:720–736. | Akkaya H et al. (2024). O-RADS MRI Scoring: Diagnostic Accuracy, Interobserver [illegible] and Applicability to Machine Learning. Br J Radiol. | Kotian S et al. (2026). Diagnostic Performance of Machine Learning Models in Adnexal Masses. F1000Research, 15:...

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- MRI CASE REPORT

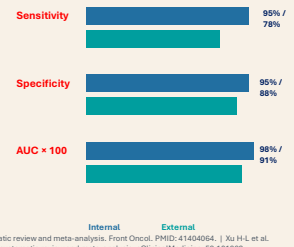
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- MRI CASE REPORT

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## The Generalizability Gap: Internal vs. External Validation

- Meta-Analysis Evidence (Li et al., 2025; 18 studies, 22,697 subjects/images):
- Internal Validation: Sensitivity 95%, Specificity 95%, AUC 0.98.
- External Validation: Sensitivity 78%, Specificity 88%, AUC 0.91.
- Drivers of Transportability Loss: Differences in scanner vendors, image acquisition parameters, patient case mix, and local disease prevalence.




Li R et al. (2025). Artificial intelligence in ultrasound diagnosis of adnexal masses: systematic review and meta-analysis. Front Oncol. PMID: 41404064. | Xu H-L et al. (2022). Artificial intelligence performance in image-based ovarian cancer identification: A systematic review and meta-analysis. eClinicalMedicine, 53:101662.

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## Risk of Bias, Limitations, and Automation Bias

- High Risk of Bias: Systematic reviews indicate ~95% of ultrasound AI studies carry a high risk of bias under QUADAS-2, mainly due to a lack of external validation cohorts and uncalibrated models.
- Static Slices vs. Dynamic Sweeps: Models trained on curated static images lack the multi-angle spatial assessment used by clinicians during real-time scanning.
- Risk of Automation Bias: Less-experienced readers may defer uncritically to algorithm predictions during difficult borderline cases.
- Clinical Benchmark Parity: Well-validated clinical models like IOTA ADNEX frequently match or exceed standalone AI models on prospective datasets.

95% — Studies at high risk of bias*

STATIC — Curated slices ≠ dynamic sweeps

CAUTION — Automation bias in non-experts

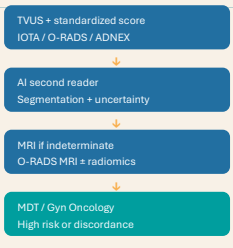
*Approximate estimate reported in source document

PRIMARY LITERATURE: Moro F et al. (2024). Role of artificial intelligence applied to ultrasound in gynecology oncology. Int J Cancer, 155. | Moro F et al. (2025). Performance of radiomics analysis in ultrasound imaging. Acta Obstet Gynecol Scand, 104. | Moro F et al. (2026). Developing and validating ultrasound-based machine-learning models incorporating radiomics features. Ultrasound Obstet Gynecol, 67. | Geysels A et al. (2025). Artificial Intelligence Applied to Ultrasound Diagnosis of Pelvic Gynecological Tumors. Gynecol Obstet Invest, 91.

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## Practical Integration: US → MRI → Selective AI

- **1st-Line Evaluation**: High-quality transvaginal ultrasound using standardized IOTA terminology and O-RADS / ADNEX scoring.
- **AI Decision Support**: AI acts as a second reader, providing automated segmentation and quality/uncertainty flags.
- **Secondary Problem Solving**: Escalation to O-RADS MRI for indeterminate ultrasound findings, supplemented by radiomics for O-RADS 4–5 cases.
- **Multidisciplinary Reconciliation**: Final management reconciles imaging outputs with patient symptoms, menopausal status, and biomarkers.




Zeng S et al. (2025). Multimodal ultrasound-based radiomics and deep learning for differential diagnosis of O-RADS 4–5 adnexal masses. Cancer Imaging, 25. | Yadav NK et al. (2026). Artificial intelligence in ocular and adnexal tumours: A systematic review. IP Int J Ocular Oncol Oculoplast.

15

## Key Takeaways & Future Directions

- Established Models are Strong: IOTA ADNEX and expert subjective evaluation remain strong comparators.
- Targeted Value Creation: AI offers the most value in standardizing image acquisition, supporting non-expert examiners, and refining indeterminate lesions.
- Prospective Proof Required: Widespread adoption requires prospective multicenter trials evaluating patient outcomes, surgical safety, and cost-effectiveness.
- Where would a reliable second reader add most value in your practice?

01 — Strong clinical baselines

02 — Targeted AI support

03 — Prospective outcomes needed

Li R et al. (2025). Front Oncol. PMID: 41404064. | Geysels A et al. (2025). Gynecol Obstet Invest. DOI: 10.1159/000545850. | Wu Y-N et al. (2026). NPJ Precision Oncology. DOI: 10.1038/s41698-026-01320-5.

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Barcroft J et al. (2024). Machine learning and radiomics for segmentation and classification of adnexal masses on ultrasound. NPJ Precision Oncology

Dai W-L et al. (2024). Ultrasound deep-learning pipeline for ovarian masses. eClinicalMedicine, 78:102923. PMID: 39640935

Dhar MK et al. (2026). Deep Learning Framework for Enhanced Ovarian Adnexal Mass Classification. J Imaging Inform Med.

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Li R et al. (2025). Artificial intelligence in ultrasound diagnosis of adnexal masses: systematic review and meta-analysis. Front Oncol. PMID: 41404064.

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Moro F et al. (2024). Role of artificial intelligence applied to ultrasound in gynecology oncology. Int J Cancer, 155.

Moro F et al. (2025). Performance of radiomics analysis in ultrasound imaging. Acta Obstet Gynecol Scand, 104.

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Thomassin-Naggara I et al. (2024). Artificial intelligence applications in ovarian lesion MRI. J Magn Reson Imaging, 59:720–736.

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Whitney HM et al. (2024). AI-based automated segmentation for ovarian/adnexal masses on ultrasound. J Med Imaging, 11.

Wu Y-N et al. (2026). Development and validation of an artificial intelligence-based model for diagnosing benign, borderline, and malignant adnexal masses. NPJ Precision Oncology

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Yoeli-Bik R et al. (2025). Hybrid artificial intelligence echogenic components-based diagnosis. Med Phys, 52.

Zeng S et al. (2025). Multimodal ultrasound-based radiomics and deep learning for differential diagnosis of O-RADS 4–5 adnexal masses. Cancer Imaging, 25.


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## Benign Gynecologists' Approach to the Adnexal Mass

**Jubilee Brown MD**
Professor and Director of Gynecologic Oncology
Levine Cancer Institute, Charlotte, NC

Levine Cancer Institute

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## Objectives

- To incorporate scientific data into the management of adnexal masses
- To integrate anatomic knowledge and improve surgical technique
- To avoid surgical spill in the management of adnexal masses and to understand the consequences of such spill

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## Adnexal Masses



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## Adnexal Masses

- Preoperative evaluation and risk of malignancy
- Criteria for referral
- Operative considerations (rupture, contained extraction)
- When to send a frozen
- What if it's cancer?
- What if it's a borderline tumor?
- What if you see disseminated disease?
- What if she is pregnant?

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## Preoperative Evaluation and Risk of Malignancy

- 17 year old female with a 12 cm solid right adnexal mass
- 44 year old female with an 8 cm asymptomatic complex left ovarian cyst
- 65 year old female with a 4 cm complex left ovarian cyst

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## Preoperative Evaluation Epidemiology

- Adnexal masses are more common than ovarian CA
  - Annual incidence of developing an ovarian cyst=8%
  - Most resolve spontaneously
- KY Ovarian Cancer Screening Program (n=33,260)
  - 17% had ovarian cysts/masses on 1st screening
- PLCOC Screening Trial (n=16,000)
  - 14% of women >55 yo had simple cysts
- Postmenopausal risk of CA in a cyst: 36-59%

Pavlik EJ, Obstet Gynecol 2013; Greenlee RT, Am J Obstet Gynecol 2019; Saunders BA, Gynecol Oncol 2010
Im SS, Obstet Gynecol 2005; Roman LD, Obstet Gynecol 1997

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## Preoperative Evaluation Epidemiology

- Increased risk of malignancy in postmenopausal women: >65 yo has 6x risk of cancer
- Majority are benign

*TABLE 1. Differential Diagnosis of Postmenopausal Women With an Adnexal Mass*

| Gynecologic Ovarian | Gynecologic Extraovarian | Nongynecologic |
|---|---|---|
| Benign | Benign | Benign |
| Mature teratoma | Endometrioma | Appendiceal abscess |
| Ovarian torsion | Hydrosalpinx | Appendicitis |
| Polycystic ovaries | Tuboovarian abscess | Bladder diverticulum |
| Cystadenoma | Paraovarian cyst | Diverticular abscess |
| Endometrioma | Peritoneal inclusion cyst | Nerve sheath tumor |
| Simple cyst | Pedunculated fibroid | Pelvic kidney |
| | | Peritoneal cyst |
| | | Ureteral diverticulum |
| Malignant | Malignant | Malignant |
| Borderline tumors | Endometrial carcinoma | Metastasis (breast, lymphoma, etc.) |
| Epithelial carcinoma | Fallopian tube carcinoma | Krukenberg tumor |
| Ovarian germ cell tumor | | Retroperitoneal sarcomas |
| Ovarian sarcoma | | |
| Sex-cord or stromal tumor | | |

Koonings P, et al, Obstet Gynecol 1989; Rauh-Hain JA et al, Clinical Obstet Gynecol 2015; Howlader N, SEER Cancer Statistics Review

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## Preoperative Evaluation H&P

- Asymptomatic; bloating, pressure, pain, N/V, fatigue, change in bowel/bladder habits
- Fever or estrogenic signs may help with diagnosis
- Pelvic exam: sensitivity 45%, specificity 90%
  - Irregular, fixed, nodular mass, ascites - think cancer
  - Obesity and inexperience are confounders

Padilla LA, Int J Gynaecol Obstet 2005

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## Preoperative Evaluation Markers

- CA-125 elevated in 80-85% of women with ovarian CA
- Terrible screening test - elevated in everything
- Sensitivity and specificity = 78% (pooled analysis)
- Better in post-menopausal than pre-menopausal pts.
- Trends may be more predictive than single values, but not assessed yet in evaluation of a known mass
- Differ with regard to race: lower values in black women

Padilla LA, Int J Gynaecol Obstet 2005; Hellerstrom I, Adv Exp Med Bio, 2005; Myers ER, Evid Rep Technol Assess 2006; Skates SJ, J Clin Oncol 2003; Pauler D, Cancer Epidemiol Biomarkers Prev 2001, Skates SJ, CPR 2011

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## Preoperative Evaluation Markers

- HE-4: 75% sensitive, 86% specific
- Combination was a better predictor than either marker alone
  - 85% combination
  - 61% CA-125
  - 77% HE-4

Lin JY, Asian Pac J Cancer Prev, 2012; Abdel-Azziz HA, Asian Pac J Cancer Prev 2010

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## Preoperative Evaluation Modified ACOG Criteria

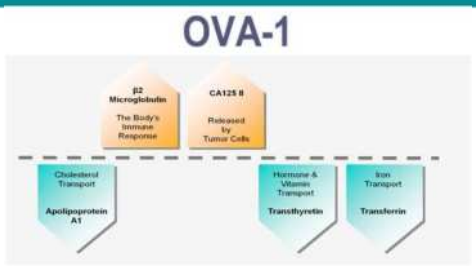
- Detailed history: symptoms and genetic risk
- PE
- Pelvic US
- Serum CA-125

Dearking AC, Obstet Gynecol 2007

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## Preoperative Evaluation Risk of Malignancy




- Higher sensitivity, lower specificity for detecting CA than physician assessment or CA-125 alone
- 95% when combined with physician assessment

Ueland FR, Obstet Gynecol 2011; Longoria TC, Am J Obstet Gynecol 2014

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## Preoperative Evaluation ROMA

- OVA-1: 494 pts; compared to clinical impression/CA-125
  - Correctly identified 83% of malignancies missed by clinical impression
  - Correctly identified 71% of cases missed by CA-125
  - NPV: 98%
- KY: 524 evaluable patients: higher sensitivity, lower specificity
- ROMA in black women with adnexal masses have lower sensitivity to detect malignancy than MIA

Dunton C, Biomark Cancer 2019; Bristow RE Gynecol Oncol 2013; Ueland FR, Obstet Gynecol 2011

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## Preoperative Evaluation Cost Effectiveness

- Multivariate index assay vs. ACOG and CA-125
  - Cost in each scenario: ~$12K
  - QALY highest in MIA
  - MIA: cost-effective compared to mACOG or CA-125
  - ICER: $35,094/QALY gained
  - MIA is "cost-saving": $486 for CA125 and $108 mACOG
  - MIA: 1930 fewer reoperations (1.9% of patients) and 2412 fewer CT scans (2.3% of patients) which would have been required due to false negative results

Forde GK, Current Med Research Opinion, 2016

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## Preoperative Evaluation Take Home Message

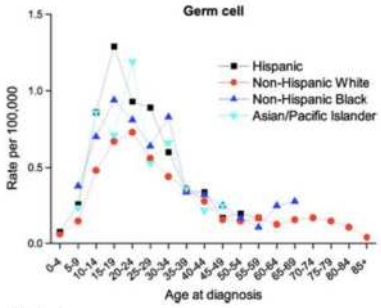
- For the benign gynecologist, the decision to refer to a gynecologic oncologist vs. operate independently is best assisted by a multivariate index assay
- This test does not substitute for a decision on whether the patient needs surgery or not
- Especially useful in black women with adnexal masses
- The "refer all" strategy appears unnecessary with current capabilities

Forde GK, Current Med Research Opinion, 2016

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## Preoperative Evaluation What about in adolescents?




Brown J, Principles and Practice, in press

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## Preoperative Evaluation What about in adolescents?

**Table 1. Serum Biomarker and Multimodal Test Results Considered Abnormal in Women With Adnexal Masses***

| Test | Premenopausal | Postmenopausal |
|---|---|---|
| CA 125 | —† | > 35 U/mL |
| MIA | ≥ 5.0 | ≥ 4.4 |
| ROMA | ≥ 1.31 | ≥ 2.77 |
| RMI | > 200 | > 200 |

▶ The evaluation of adnexal masses in adolescents is similar to that in premenopausal women. Management of adnexal masses in adolescents should prioritize ovarian conservation to preserve fertility.

ACOG Practice Bulletin 174, November 2016

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## Preoperative Evaluation Imaging - US

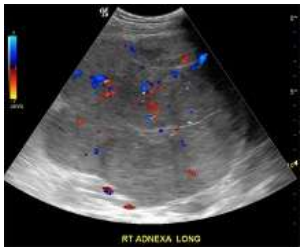
- Transvaginal US: accuracy parallels experience
- Increased vascularity, decreased peripheral flow, increased velocity (Not sensitive/specific)
- Morphologic scoring systems
  - Sensitivity 82-91%
  - Specificity 68-77%
  - Poor PPV, no difference among scoring systems

Myers ER, Evid Rep Technol Assess 2006

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## Preoperative Evaluation
## US and CT in 8 yo with dysgerminom






On color doppler assessment the mass demonstrates flow confirming its sold nature.

Axial contrast-enhanced CT shows a mass solid mass in the right ovary (arrow).

Brown J, Principles and Practice, in press
Credit: Priya Bhosale, MD

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## Preoperative Evaluation
## Imaging - CT / MRI / PET

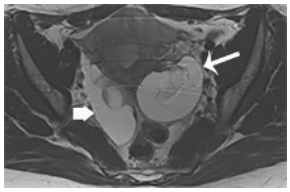
- CT: Useful for surgical planning in a known or suspected malignancy; not first line screening
- MRI: Sens/Spec up to 100% (PPV 42%) so may be second line screening in patients with an indeterminate mass
- Sensitivity of US not significantly improved by adding PET or MRI.
  - US is the most important diagnostic tool in the detection and assessment of asymptomatic adnexal masses, the additional cost in most situations is not justified

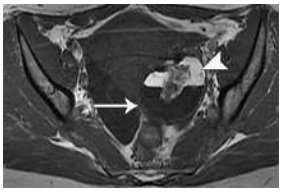
Fenshel S, Radiology 2002

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## Preoperative Evaluation
## MRI in 43 yo with mature teratoma





T2 axial pelvic MRI shows a mass in the left adnexa, which has fluid and fat (thin arrow) and a cystic lesion in the right adexa (fat arrow)

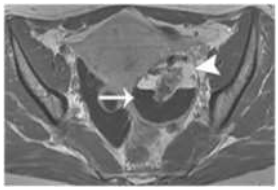
Precontrast T1 weighted image shows a mass in the left adnexa with a fat fluid level. The fat has a high signal (arrow head) and the fluid has a low signal (arrow)

Brown J, Principles and Practice, in press
Credit: Priya Bhosale, MD

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## Preoperative Evaluation
## MRI in 43 yo with mature teratoma



Postcontrast T1 weighted image shows a mass in the left adnexa with a fat fluid level. The fat has a high signal (arrow head), and the fluid has a low signal (arrow). Note that the mass does not enhance.

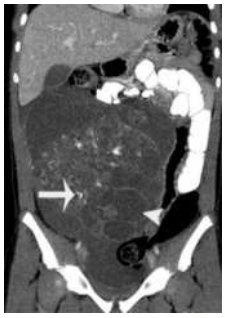
Brown J, Principles and Practice, in press
Credit: Priya Bhosale, MD

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## Preoperative Evaluation
## CT in 37 yo with immature teratoma



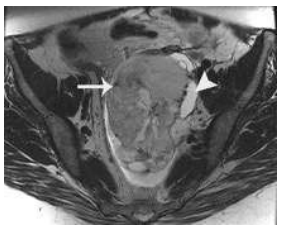


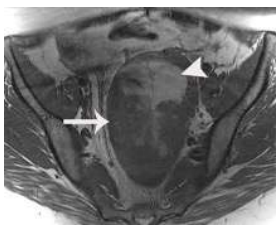
Brown J, Principles and Practice, in press
Credit: Priya Bhosale, MD

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## Preoperative Evaluation
## MRI: 43 year old with yolk sac tumor





T2 axial pelvic MRI shows a mass in the left adnexa. This has soft tissue component (arrow) and cystic areas (arrowhead)

T1 axial MRI of the pelvis shows a mass in the left adnexa with soft tissue component ( arrow ) and blood products (arrow).

Brown J, Principles and Practice, in press
Credit: Priya Bhosale, MD

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## Preoperative Evaluation Imaging - CT / MRI / PET

- CT: Useful for surgical planning in a known or suspected malignancy; not first line screening
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Fenshel S, Radiology 2002

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## Preoperative Evaluation IOTA

- Different prediction models based on regression analysis
- Simple Rules and ADNEX models have been validated and show best performance to discriminate benign vs CA
- Simple Rules: 10 binary features; online calculator
- ADNEX +/- CA-125

| | | |
|---|---|---|
| ADNEX without CA 125: risk model based on multinomial logistic regression | Age (years), maximum diameter of lesion (mm), maximum diameter of largest solid component (mm), number of papillary projections (ordinal), presence of acoustic shadows, presence of ascites, presence of more than 10 cyst locules, type of center (oncology center vs other) | Risk estimates<br>Also estimates risk of four subtypes of malignancy<br>Based on clinical and ultrasound information<br>Subjective predictors are avoided *a priori* |

Timmerman D, Int J Gynecol Cancer 2021

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## Criteria for referral

***TABLE 2. The Society of Gynecologic Oncologists and the American College of Obstetrics and Gynecology Guidelines for Patients With Newly Diagnosed Pelvic Masses***

| |
|---|
| Premenopausal women (younger than 50 y) |
| CA-125 antigen level > 200 U/mL |
| Ascites |
| Evidence of abdominal or distant metastasis (by results of examination or imaging study) |
| Family history of breast or ovarian cancer (in a first-degree relative) |
| Postmenopausal women (50 y or older) |
| CA-125 antigen level > 35 U/mL |
| Ascites |
| Nodular or fixed pelvic mass |
| Evidence of abdominal or distant metastasis (by results of examination or imaging study) |
| Family history of breast or ovarian cancer (in a first-degree relative) |

ACOG Practice Bulletin, Number 83, July 2007

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## Criteria for referral

- Postmenopausal with elevated CA 125 level, ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis
- Premenopausal with very elevated CA 125 level, ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis
- Premenopausal or postmenopausal with an elevated score on a formal risk assessment test such as the multivariate index assay, risk of malignancy index, or the Risk of Ovarian Malignancy Algorithm or one of the ultrasound-based scoring systems from the International Ovarian Tumor Analysis group

ACOG Practice Bulletin, Number 174, November 2016

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## Criteria for referral

- Pre-menopausal: Refer if
  - Premenarchal with elevated tumor markers
  - Reproductive age with
    - CA-125 > 100
    - Ascites
    - Evidence of abdominal or distant metastases
    - Ovarian or breast cancer in first degree relative
- Post-menopausal: Refer if
  - Same as above with ANY elevation in CA-125
  - Nodular or fixed pelvic mass

ACOG Practice Bulletin, Number 83, July 2007

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## Criteria for genetics referral – Hereditary CA




- **Known family mutation**
- **Ovarian cancer at any age**
- **Breast Cancer**
  - < 45 yo
  - < 50 yo with a
    - Second primary cancer, or
    - Relative with breast, ovarian, pancreatic, high grade prostate
  - < 60 yo with TNBC
  - History of male breast cancer

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## Criteria for referral – Hereditary Cancers

### SGO Clinical Practice Statements

- Genetic Testing for Ovarian Cancer, October 2014
  - Women diagnosed with epithelial ovarian, tubal, and peritoneal cancers should receive genetic counseling and be offered genetic testing, even in the absence of a family history.
- Screening for Lynch Syndrome in Endometrial Cancer, March 2014
  - All women diagnosed with endometrial carcinoma should undergo systematic clinical screening (review of personal and family history) and/or molecular screening for Lynch syndrome, a hereditary cancer syndrome.
  - Endometrial carcinomas can be screened for Lynch syndrome using immunohistochemistry (IHC) for the four mismatch repair proteins (MLH1, MSH2, MSH6, PMS2), microsatellite instability (MSI) analysis, and MLH1 hypermethylation testing.

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## A Comprehensive Program Enabling Effective Delivery of Regional Genetic Counseling

Article in International Journal of Gynecological Cancer 28(5):1 · April 2018 with 13 Reads
DOI: 10.1097/IGC.0000000000001256

Objectives: The aim of this study was to demonstrate the utility of a comprehensive program involving management-based evidence, telemedicine, and patient navigation to provide genetic counseling services for patients with ovarian and breast cancer across a geographically large health care system. Methods: We identified all patients with newly diagnosed ovarian and breast cancer in our health care system from January 2013 to December 2015 through the cancer registry. Referral characteristics and testing outcomes were recorded for each year and compared using the χ or Fisher exact test. Results: Because the implementation of this program, the number of new ovarian cancer cases remained constant (109-112 cases/year) but patients referred for genetic counseling increased annually from 37% to 43% to 96% ($P < 0.05$). The percentage of ovarian cancer patients who underwent genetic testing increased annually from 24% to 27% to 53% ($P < 0.05$). The number of new breast cancer patients was constant (1543-1638 cases/year). The percentage of patients with triple negative breast cancer referred for genetic counseling rose from 69% in 2013 to 91% in 2015; the percentage of patients who underwent testing increased annually from 59% to 86% ($P < 0.05$). Of women with breast cancer diagnosed at less than 45 years of age, 78% to 85% were referred for genetic counseling across this period; the percentage of patients who underwent testing increased annually from 66% to 82% ($P < 0.05$). Patient navigation was initiated and was available to all patients in the system during this period. Telemedicine consults were performed in 118 breast/ovarian patients (6%) during this period. Conclusions: A comprehensive program may improve access to effective genetic counseling services in patients with ovarian and breast cancer despite geographic barriers.

Brown et al Int J Gynecol Cancer

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## If a hereditary mutation is found, should you do RRSO?

- RRSO is fine for benign gyn to do! Just follow the rules:
  - Skeletonize the ovarian vessels for complete removal
  - Inspect peritoneal surfaces and biopsy anything suspicious
  - Peritoneal washings
  - Identify patient as high risk to pathology (complete sectioning)
  - Remove the adnexa in a bag to preserve epithelium
  - There is a chance of finding cancer at the time of surgery - particularly in older women with BRCA1

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## If a hereditary mutation is found, should you include a hysterectomy?

- YES

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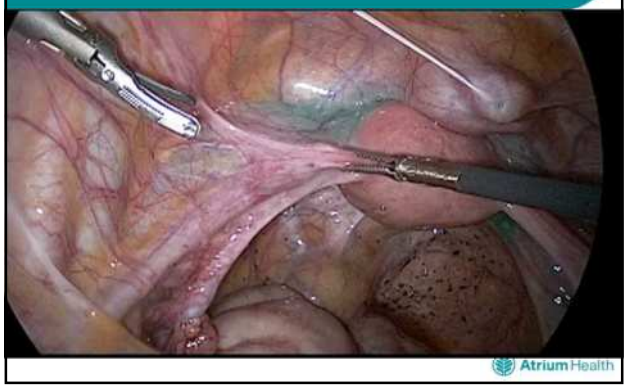
## Nuts and Bolts: When and how to operate



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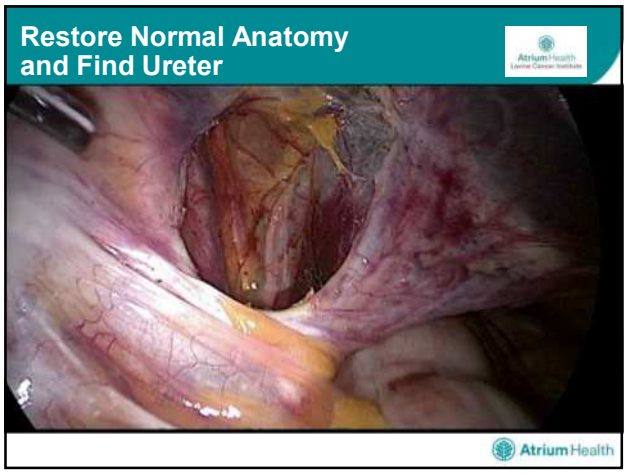
36

## Access Retroperitoneum (think triangle)

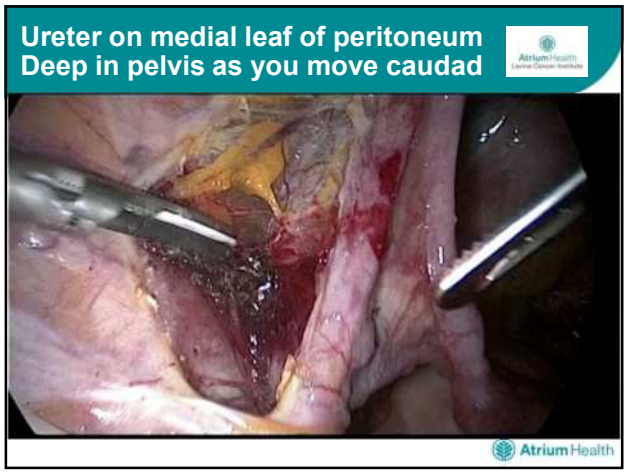


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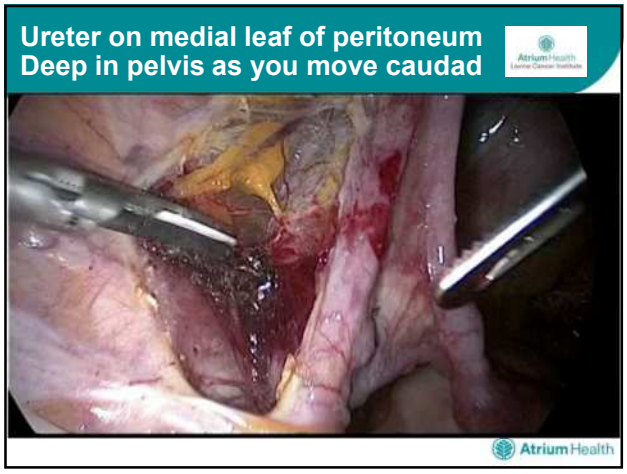
37



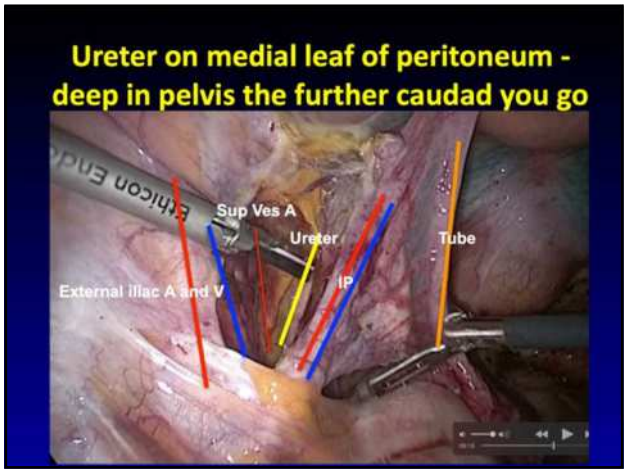

38



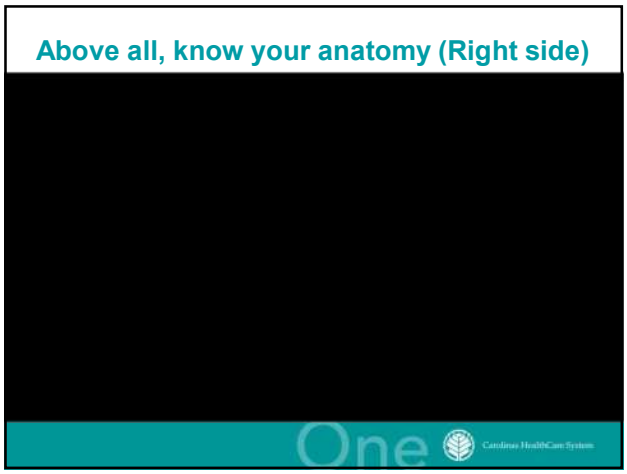

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42




43

## Operative considerations: Rupture

- Overall rate of rupture = 25%
- Risk factors: Endometriosis, adhesions, clear cell CA, grade, non-mucinous histology
- Tumor size is NOT associated with rupture rusk
- Most reports suggest that LSC is NOT associated with increased risk of rupture
- Conversion from IA to IC does not necessarily portend a worse prognosis
  - Clear Cell CA, epithelial ovarian CA, Pediatric ovarian neoplasms: No difference in any outcome as long as chemotherapy administered
  - Risk of death is increased in borderline ovarian tumors
  - Risk of relapse is increased in granulosa cell tumors

Suh 2015; Kumar 2015; Kim EJSO 2013; Liu Int J Gynecol Cancer 2014; Desfeux Gynecol Oncol 2005; Gallotta Gynecol Oncol 2015; Romagnolo Gynecol Oncol 2006 ; Higashi Gynecol Oncol 2011; Wilson Gynecol Oncol 2015

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## Summary of Rupture Risk: Meta-Analysis

- Preop involvement is worse than intraop rupture (HR 1.47; 1.01-2.14)
- Intraop rupture is worse than no rupture at all (HR 2.41; 1.74-3.33)
- Intraop rupture is no different that no rupture at all if patients are completely staged and receive chemotherapy if needed
  (HR 1.49; 0.45-4.95)

Kim Eur J Surg Oncol 2013; 39:279-289

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## Operative considerations: Contained Extraction



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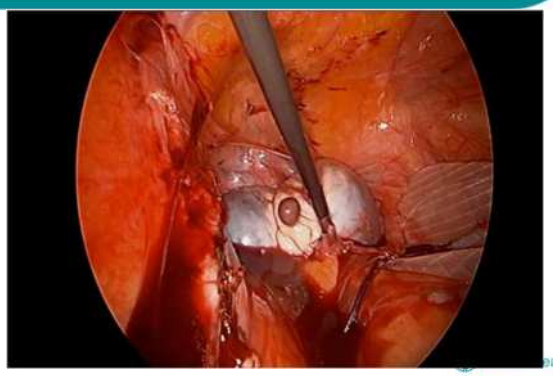
46



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## Choose the right bag and site of exit for your mass



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## Choose the right bag and site of exit for your mass



49

## Choose the right bag and site of exit for your mass



50

## Choose the right bag and site of exit for your mass



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## Operative considerations: When to send a frozen?

- When it will change your management or counseling



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## Operative considerations: What if it's cancer?



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## Operative considerations: What if it's cancer?

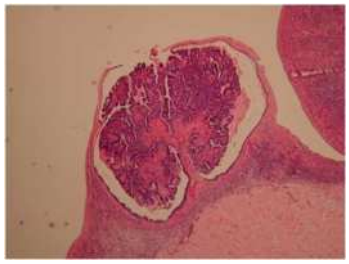
- Consult gyn onc if possible
- Remove the mass
- Do washings
- Take copious pictures
- Biopsy suspicious lesions
- Do NOT open
- Get out of Dodge
- Peritoneal bx
- +/- omental bx



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## Operative considerations: What if it's a borderline tumor?

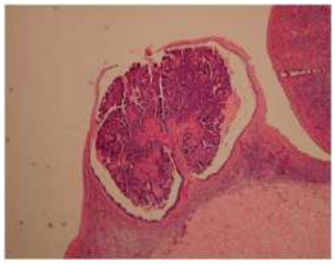




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## Operative considerations: What if it's a borderline tumor?

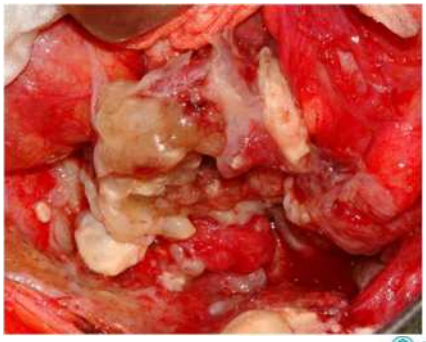
- Call Gyn Onc if possible
- Complete your procedure
- Take washings
- Take copious pictures
- Do NOT open
- Sample suspicious areas
- Peritoneal and omental bx



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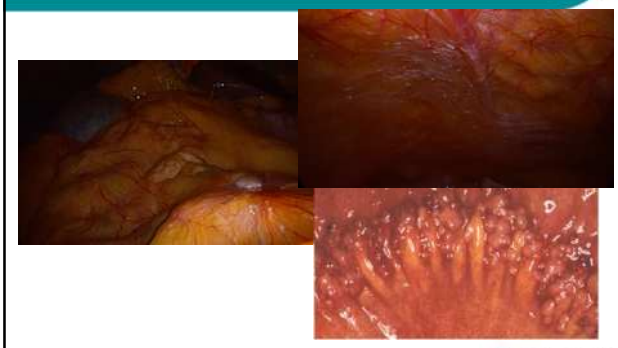
## Operative considerations: What about disseminated disease?



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## Operative considerations: What about disseminated disease?

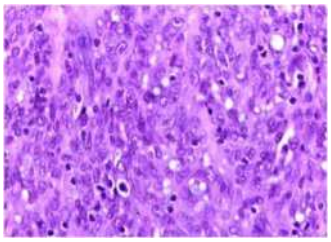


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## Operative considerations: What about disseminated disease?

- Call Gyn Oncology if possible
- Biopsy and stop
- Do not open
- Take a lot of pictures



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## Why send to Gyn Onc? They do better.

- Stage I-II disease (GO vs Gyn vs GenSurg)
  - More likely to have LND: 60% vs. 36% vs. 16%
  - More likely to be debulked: 58% vs. 51% vs. 40%
  - Better survival (hazard ratio 0.85 and 0.86 compared with general surgeons)
- Improved survival by stage (GO vs Gyn)
  - 86% vs. 70% in Stage I-II patients
  - 21% vs. 13% in Stage III-IV patients
  - More patients achieved no residual disease

Earle et al., J Natl Cancer Inst 98:172, 2006
Engelen et al., Cancer 106:589, 2006

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## Why send to Gyn Onc? They do better.

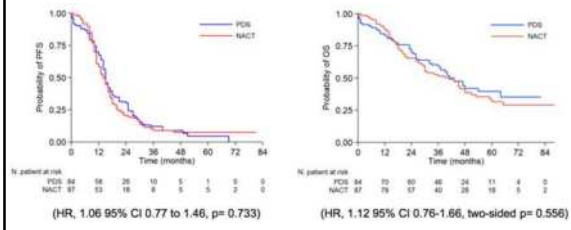
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Earle et al., J Natl Cancer Inst 98:172, 2006
Engelen et al., Cancer 106:589, 2006

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# SCORPION Trial




(HR, 1.06 95% CI 0.77 to 1.46, p= 0.733) (HR, 1.12 95% CI 0.76-1.66, two-sided p= 0.556)

OncLive State of the Science SUMMIT

Fagotti A, SGO 2

62

## Results of MIS vs. Open Interval Cytoreduction after NACT

- MIS was completed without conversion in 44/53 patients (83%)
  - 9 converted to open (17%)
  - 25 required a hand port/minilap (47%)
  - 19 Laparoscopy only (36%)



OncLive State of the Science SUMMIT

Drury L, Gynecol Oncol 149(3):620, 2018

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# Results

- 10% of patients had a complete pathologic response to NACT (13% MIS and 8% Lap, p=0.494)

| | MIS | Open Surgery |
|---|---|---|
| R0 | 32 (60.4%) | 43 (44.3%) |
| Optimal | 19 (35.9%) 96% | 41 (42.3%) 87% |
| Suboptimal | 2 (3.8%) | 13 (13.4%) |

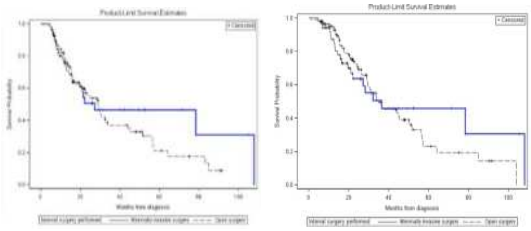
p = 0.07

OncLive State of the Science SUMMIT

Drury L, Gynecol Oncol 149(3):620, 20

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# No Difference in PFS or OS



PFS: 27 vs. 29m p=0.45

OS: 37 vs. 35m p=0.74

OncLive State of the Science SUMMIT

Drury L, Gynecol Oncol 149(3):620, 2018

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## What if she's pregnant?




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## What if she's pregnant?

- Early 2nd trimester: 17-19 weeks
  - Progesterone supplementation required if corpus luteum removed prior to 8 weeks
  - Optimal timing is early second trimester (14-19 weeks) although safe throughout pregnancy
- VTE Prophylaxis: Intra- and postop SCD's, early ambulation; unfractionated heparin: no data
- Document fetal heart tones before and after procedure
- Also monitor for contractions before & after if viable
- No support for prophylactic tocolysis
- Obstetric consultation if preterm labor ensues to determine utility of tocolysis
- Suggest multidisciplinary team approach

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## What if she's pregnant?



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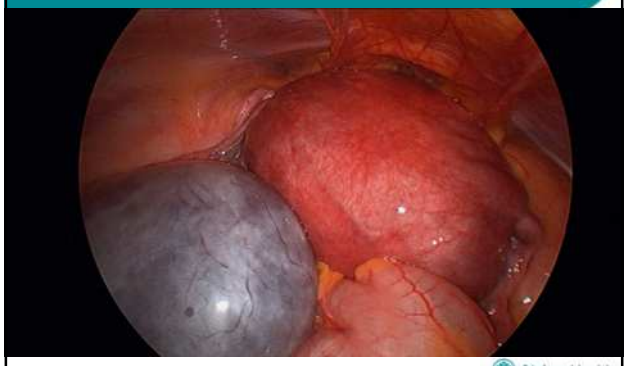
## What if she's pregnant?



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## What if she's pregnant?



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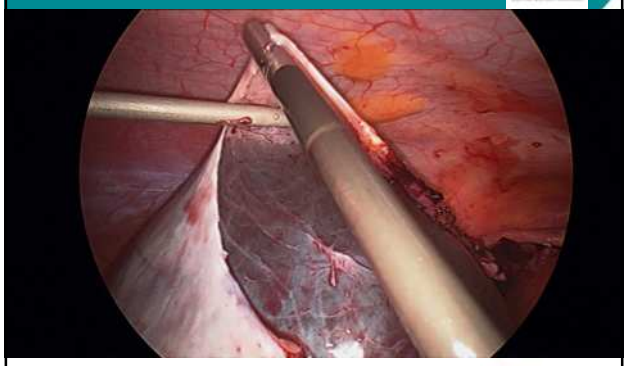
## What if she's pregnant?



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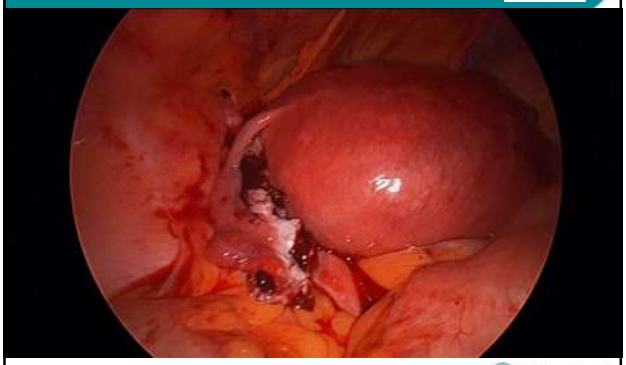
## What if she's pregnant?



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## What if she's pregnant?



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## THANK YOU - and questions?



Jubilee Brown MD
832-289-6133
jubilee.brown@me.com

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# CULTURAL AND LINGUISTIC COMPETENCY & IMPLICIT BIAS

The California Medical Association (CMA) outlines standards for Cultural Linguistic Competency and Implicit Bias in CME. The goal of the standards is to support the role of accredited CME in advancing diversity, health equity, and inclusion in healthcare. These standards are relevant to ACCME-accredited, CMA-accredited, and jointly accredited providers located in California. AAGL is ACCME-accredited and headquartered in California.

CMA developed the standards in response to California legislation (Business and Professions (B&P) Code Section 2190.1), which directs CMA to draft a set of standards for the inclusion of cultural and linguistic competency (CLC) and implicit bias (IB) in accredited CME.

The standards are intended to support CME providers in meeting the expectations of the legislation. CME provider organizations physically located in California and accredited by CMA CME or ACCME, as well as jointly accredited providers whose target audience includes physicians, are expected to meet these expectations which began on January 1, 2022. AAGL has been proactively adopting processes that meet and often exceed the required expectations of the legislation.

CMA CME offers a variety of resources and tools to help providers meet the standards and successfully incorporate CLC & IB into their CME activities, including FAQ, definitions, a planning worksheet, and best practices. These resources are available on the CLC and IB standards page on the CMA website.

**Important Definitions:**

**Cultural and Linguistic Competency (CLC)** – The ability and readiness of health care providers and organizations to humbly and respectfully demonstrate, effectively communicate, and tailor delivery of care to patients with diverse values, beliefs, identities and behaviors, in order to meet social, cultural and linguistic needs as they relate to patient health.

**Implicit Bias (IB)** – The attitudes, stereotypes and feelings, either positive or negative, that affect our understanding, actions and decisions without conscious knowledge or control. Implicit bias is a universal phenomenon. When negative, implicit bias often contributes to unequal treatment and disparities in diagnosis, treatment decisions, levels of care and health care outcomes of people based on race, ethnicity, gender identity, sexual orientation, age, disability and other characteristics.

**Diversity** – Having many different forms, types or ideas; showing variety. Demographic diversity can mean a group composed of people of different genders, races/ethnicities, cultures, religions, physical abilities, sexual orientations or preferences, ages, etc.

**Direct links to AB1195 (CLC), AB241 (IB), and the B&P Code 2190.1:**

Bill Text – AB-1195 Continuing education: cultural and linguistic competency.
Bill Text – AB-241 Implicit bias: continuing education: requirements.
Business and Professions (B&P) Code Section 2190.1

**CLC & IB Online Resources:**

Diversity-Wheel-as-used-at-Johns-Hopkins-University-12.png (850×839) (researchgate.net)
Implicit Bias, Microaggressions, and Stereotypes Resources | NEA
Act, Communicating, Implicit Bias (racialequitytools.org)
https://www.contemporaryobgyn.net/view/overcoming-racism-and-unconscious-bias-in-ob-gyn
https://pubmed.ncbi.nlm.nih.gov/34016820/
https://hr.ucdavis.edu/departments/learning/certificate/implicit-bias
https://pmc.ncbi.nlm.nih.gov/articles/PMC7011228/