LEARNING OBJECTIVES

• To be aware of the PALM-COEIN classification system for causes of AUB in reproductive age women
• To identify the most common gynecologic ultrasound findings
• To understand when to utilize vaginal ultrasound and sonohysterography for evaluation of perimenopausal abnormal bleeding.
PALM-COEIN SYSTEM

• Universal system of nomenclature that classifies uterine bleeding abnormalities and etiologies in reproductive aged women.

• Introduced by FIGO in 2011 and supported by ACOG in 2012

• Abnormal uterine bleeding – specific descriptor terms
  • Menorrhagia = Heavy menstrual bleeding (AUB-HMB)
  • Metrorrhagia = Intermenstrual bleeding (AUB-IMB)
PALM-COEIN SYSTEM

PALM (Structural Causes)

• Polyp (AUB-P)
• Adenomyosis (AUB-A)
• Leiomyoma (AUB-L)
  • Submucosal (AUB-L_{SM})
  • Other myoma (AUB-L_{O})
• Malignancy and Hyperplasia (AUB-M)

FIGO, 2011.
COEIN (Nonstructural Causes)

• Coagulopathy (AUB-C)
• Ovulatory dysfunction (AUB-O)
• Endometrial (AUB-E)
• Iatrogenic (AUB-I)
• Not classified (AUB-N)

FIGO, 2011.
STRUCTURAL UTERINE PATHOLOGY
ENDOMETRIAL POLYP

• Well-defined, homogeneous, polypoid lesion *isoechoic* to endometrium

• Intact endometrial-myometrial interface

• Atypical features: cystic components, multiple polyps, broad base, & hypoechogenicity or heterogeneity

ADENOMYOSIS
BRIGHT EDGE

Echo formed by interface between intracavitary lesion and endometrium

*Ultrasound Obstet Gynecol* 2010;35:103-112.
ENDOMETRIAL POLYPS

Slide courtesy of Linda Darlene Bradley, MD.
BROAD-BASED INTRACAVITARY POLYP
HYSTEROSCOPIC VIEW
BROAD-BASED INTRACAVITARY POLYP
ADENOMYOSIS
FINDINGS ON IMAGING

• Globular, bulky uterus
• Heterogeneous myometrium
• Myometrial cysts
• Asymmetric myometrial thickness
• Loss of clarity of endo-myometrial interface
• Subendometrial echogenic linear striations
ADENOMYOSIS
HISTOLOGIC CRITERIA

• Presence of endometrial glands & stroma 2.5 mm below basal layer of endometrium
• Prevalence varies from 31% to 61% depending on number of tissue sections
ADENOMYOSIS

Globular uterus with myometrial heterogeneity
ADENOMYOMA

- Echogenic mass
- Ill-defined borders
- Uterine enlargement
- Heterogeneous myometrium
FOCAL ADENOMYOMA
DIFFUSE ADENOMYOSIS
ADENOMYOSIS
ASYMMETRICAL WALL THICKENING
ADENOMYOSIS
POORLY DEFINED ENDOMETRIAL-MYOMETRIAL JUNCTION
ADENOMYOSIS
LINEAR STRIATIONS/HETEROGENEOUS TEXTURE
POLYPOID ADENOMYOSIS
ADENOMYOSIS
ADENOMYOSIS
MYOMETRIAL CYSTS
ADENOMYOSIS
ADENOMYOSIS

Asymmetric anterior myometrial thickening

Note loss of normal endo-myometrial interface

Color Doppler: increased vascularity anteriorly

Heterogeneous hyperechoic changes of myometrium, loss of endo-myometrial interface, anterior myometrial cyst

Color Doppler: increased myometrial vascularity (also possible feeding vessel to endometrial polyp)

ADENOMYOSIS

Junctional zone

- Irregularly thickened
- Poorly margined
- Hypoechoic
ADENOMYOSIS

Asymmetric thickening of anterior myometrium with color Doppler flow demonstrating increased vascularity

Diffuse hyperechoic myometrial heterogeneity with anterior myometrial thickening and prominent anterior color Doppler flow.
Globular uterus with diffuse hyperechoic myometrial heterogeneity and loss of normal endo-myometrial interface.
3-D image showing linear striations of endometrium extending into myometrium.

Myometrial heterogeneity and fundal myometrial cyst

Heterogeneous hyperechoic changes of myometrium, loss of endo-myometrial interface, anterior myometrial cyst

Color Doppler: increased myometrial vascularity (also possible feeding vessel to endometrial polyp)

ADENOMYOSIS
“VENETIAN BLIND” ACOUSTIC SHADOWING
ADENOMYOSIS

• Increased vascular flow
ADENOMYOSIS

- Anechoic lacuna in posterior myometrium
- Asymmetric heterogeneity and hypervascular flow
SUBMUCOUS MYOMA

• Well-defined, broad-based, hypoechoic, solid mass
• Posterior acoustic shadowing
• Overlying echogenic endometrium
• Distortion of endometrial-myometrial interface
• Atypical features: pedunculation, multilobulated surface

SUBMUCOUS MYOMA

Grade 0
(100% within cavity)

Grade 1
(≥50% into cavity)

Grade 2
(<50% into cavity)

USE OF A CLASSIFICATION SYSTEM TO PREDICT COMPLETE HYSTEROSCOPIC RESECTION

<table>
<thead>
<tr>
<th>Classification</th>
<th>Type 0</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>100% within cavity</td>
<td>&gt;50% into cavity</td>
<td>&lt;50% into cavity</td>
</tr>
<tr>
<td>Hysteroscopic Resection</td>
<td>96-97%</td>
<td>86-90%</td>
<td>61-83%</td>
</tr>
<tr>
<td>Fluid Absorption Volume</td>
<td>450 mL</td>
<td>957 mL</td>
<td>1682 mL</td>
</tr>
</tbody>
</table>

*European Society of Hysteroscopy
Wamsteker K et al, 1993; Van Dongen H et al, 2006; Emanuel MH et al, 1997.
SUBMUCOUS MYOMA

Endometrial cavity

Uterine myometrium

Submucosal fibroid

Slide courtesy of Raymond W. Ke, MD.
GRADE 0
SUBMUCOSAL MYOMA
GRADE 1 SUBMUCOUS MYOMA
POSTERIOR FIBROID

Slide courtesy of Linda Darlene Bradley, MD.
POSTERIOR GRADE 2 FIBROID AFTER SIS

Slide courtesy of Linda Darlene Bradley, MD.
DIAGNOSTIC HYSTEROSCOPY IN PATIENT WITH RECURRENT PREGNANCY LOSS

Pedunculated Submucous Myoma

Tubal Ostia

Slide courtesy of Linda Darlene Bradley, MD.
33 Y.O., SEVERE MENORRHAGIA & ANEMIA
ENDOMETRIAL HYPERPLASIA

• Cannot be definitively diagnosed with SIS.

• Variable appearance
  • Global or focal
  • Localized to a polyp
  • Uniformly hyperechoic, thickened endometrium

• Endometrial thickness, echogenicity, and appearance may suggest need for biopsy or hysteroscopy.
ENDOMETRIAL HYPERPLASIA

ENDOMETRIAL HYPERPLASIA
Small irregularities can be mistaken for polyps or focal hyperplasia.
ENDOMETRIAL CARCINOMA

- Increased endometrial thickness on TVUS
- Myriad endometrial echo appearances
  - Irregularly thickened, ill-defined
  - Heterogeneous pattern
  - Mixed echogenicity with variable hypoechogenic texture
- Intact, irregular or disrupted endo-myometrial junction
- Enlarged or lobular uterus
- Distended or fluid-filled uterine cavity
ENDOMETRIAL CANCER
ENDOMETRIAL CANCER
Adapted from Munro MG. Abnormal Uterine Bleeding. Cambridge: Cambridge University Press; 2010.
Uterine Evaluation
Perimenopausal AUB

Increased risk of endometrial hyperplasia/cancer

- No
- Yes

AUB-E or O (presumptive)

- Yes
- No

EH/CA?

- No
- Yes

Management of AUB-M

Office endometrial biopsy

Adequate specimen?

- Yes
- No

Hysteroscopy or SIS

Target Lesion?

- No
- Yes

Indeterminate

Consider MRI

AUB-L_SM, AUB-P, AUB-A

Adapted from Munro MG. Abnormal Uterine Bleeding. Cambridge: Cambridge University Press; 2010.
CASES
44 Y.O., 11 MONTHS AMENORRHEA THEN BLEEDING. TVUS - THIN ENDOMETRIUM SUGGESTIVE OF ATROPHY
SIS: ENDOMETRIAL CAVITY FLUID & THIN WALLS
58 Y.O., SCANT VAGINAL BLEEDING
NO SIS DUE TO CERVICAL STENOSIS
40 Y.O. WITH MENORRHAGIA
TVUS - BENIGN ENDOMETRIAL POLYP

Hyperechoic line

Thickened central endometrial complex with cystic spaces
40 Y.O. WITH MENORRHAGIA
SIS - BENIGN ENDOMETRIAL POLYP
49 Y.O., HEAVY PERIMENOPAUSAL BLEEDING
45 y.o. perimenopausal, irregular, heavy bleeding for 20 days
56 Y.O., HEAVY POSTMENOPAUSAL BLEEDING WITH ET = 13.9 MM
HYSTEROSCOPIC VIEW
BENIGN POLYP AND ATROPHIC ENDOMETRIUM
CONCLUSIONS

• Use of the FIGO Classification system provides a systematic ultrasound evaluation for AUB
• Use TVUS and SIS to triage patients for endometrial sampling with office biopsy versus hysteroscopy.
• Consider the most common ultrasound findings for the diagnosis of adenomyosis