Ultrasound in the Evaluation of Abnormal Uterine Bleeding

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Disclosures: None

Learning Objectives

• Understand the relative value of different methods of evaluating the endometrium in patients with abnormal uterine bleeding
• Be able to better predict the presence of significant pathology in different age groups
• Be able to describe the unique capabilities of ultrasound
• Take home pearls in the evaluation of AUB with ultrasound


Endometrial Evaluation

Histologic Evaluation

• Options
  • Endometrial biopsy
  • Dilatation and curettage
  • Diagnosis best made by tissue biopsy
  • Hormonal dysregulation
  • Endometritis
  • Endometrial hyperplasia
  • Diffuse malignancy

Visual Evaluation

• Options
  • Hysteroscopy
  • Transvaginal sonography (TVS)
  • Saline-infusion sonohysterography (SIS)
  • 3D Ultrasound/SIS
  • Diagnosis best made by visualizing the endometrial cavity for focal anatomic causes
    • Polyp
    • Submucous myomas
    • Focal malignancy
Does age affect the likelihood that the cause of AUB is amenable to a sonographic diagnosis?

### Age-Based Findings at Hysteroscopy

<table>
<thead>
<tr>
<th>Age Group (#)</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>&lt; 29</td>
<td>64%</td>
<td>9</td>
</tr>
<tr>
<td>30–39</td>
<td>45%</td>
<td>36</td>
</tr>
<tr>
<td>40–49</td>
<td>42%</td>
<td>44</td>
</tr>
<tr>
<td>50–59</td>
<td>28%</td>
<td>12</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>33%</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>45%</td>
<td>107</td>
</tr>
</tbody>
</table>


### Age-Based Findings at SIS

- **(filling defects)**

<table>
<thead>
<tr>
<th>Age</th>
<th>(#)</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 29</td>
<td>68.4%</td>
<td>26</td>
<td>31.6%</td>
</tr>
<tr>
<td>30–39</td>
<td>62.5%</td>
<td>50</td>
<td>37.5%</td>
</tr>
<tr>
<td>40–49</td>
<td>68.4%</td>
<td>104</td>
<td>31.6%</td>
</tr>
<tr>
<td>50–59</td>
<td>60.4%</td>
<td>26</td>
<td>39.6%</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>60.7%</td>
<td>17</td>
<td>39.3%</td>
</tr>
<tr>
<td>Total</td>
<td>65.4%</td>
<td>223</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

Brown and Shwayder, AJUM Annual Meeting 2007

### Age-Based Findings at Surgery

- **(filling defects)**

<table>
<thead>
<tr>
<th>Age</th>
<th>(#)</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 29</td>
<td>73.7%</td>
<td>28</td>
<td>26.3%</td>
</tr>
<tr>
<td>30–39</td>
<td>67.5%</td>
<td>54</td>
<td>32.5%</td>
</tr>
<tr>
<td>40–49</td>
<td>70.4%</td>
<td>107</td>
<td>29.6%</td>
</tr>
<tr>
<td>50–59</td>
<td>67.4%</td>
<td>29</td>
<td>32.6%</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>64.3%</td>
<td>18</td>
<td>35.7%</td>
</tr>
<tr>
<td>Total</td>
<td>69.2%</td>
<td>236</td>
<td>30.8%</td>
</tr>
</tbody>
</table>

Brown and Shwayder, AJUM Annual Meeting 2007

### Timing of Studies

- G, P, LMP, BC, Surgery

### 13 y.o. G0 with AUB

- Began menses age 11
- Heavy bleeding x 10 months
- hCG = negative
Adolescent Females

- "Immature" pituitary-hypothalamic axis
  - First 2-3 years following menarche
- Coagulation Disorders
  - 19% of adolescent patients with AUB
    - 25% if initial Hb < 10 gm/dL
    - 50% if hospitalization required


13 y.o. G0 with AUB

- Coagulation evaluation: WNL
- Minimal response to oral contraceptives
- hCG = negative
- Referred for ultrasound

13 y.o. with AUB

G0P0
LMP=2/15/2011
BC: NONE
SURGERY: NONE

2/20/11

Advantage

- Preop diagnosis
- Preparation for surgery
  - Appropriate equipment
  - Preop medications
24 y.o. G1 P1001

- Presents with irregular, heavy bleeding for 8 months
- Delivered 1 year previously
- Breast fed x 2 months
- On oral contraceptives before pregnancy
- hCG: negative

24 y.o. G1 P1001

- Finds bruises on her thighs frequently
- Has bloody noses ~ 2 x a month
- Her mother had a hysterectomy for heavy bleeding

Pathogenesis of AUB
Coagulopathies – Who to Evaluate?

- History of 2 or more of the following:
  - Bruising of > 5 cm 1-2 times/month
  - Epistaxis 1-2 times per month
  - Frequent gum bleeding with flossing or brushing teeth
  - Family history of bleeding symptoms

COMMITTEE OPINION

Von Willebrand Disease in Women

• Heavy menstrual bleeding since menarche
• One of the following conditions:
  - Postpartum hemorrhage
  - Surgery-related bleeding
  - Bleeding associated with dental work
• Two or more of the following conditions:
  - Epistaxis, 1 to 2 times per month
  - Frequent gum bleeding
  - Family history of bleeding symptoms

Age and Menorrhagia

• 115 women with menorrhagia
• Age 35.4 ± 11.9 years (13-53)
• Age #  %
  - < 19  25  21.8%
  - 20-44  65  56.5%
  - > 45  25  21.7%


Age and Menorrhagia

<table>
<thead>
<tr>
<th>Abnormality</th>
<th>Total</th>
<th>&lt;19</th>
<th>20-44</th>
<th>&gt;45</th>
<th>p</th>
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<tbody>
<tr>
<td>Platelet aggregation</td>
<td>44</td>
<td>44</td>
<td>48</td>
<td>32</td>
<td>.48</td>
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<tr>
<td>Von Willebrand's factor</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>.78</td>
</tr>
<tr>
<td>Coagulation factor</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>.34</td>
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<tr>
<td>Any abnormality</td>
<td>47</td>
<td>48</td>
<td>52</td>
<td>32</td>
<td>.32</td>
</tr>
</tbody>
</table>

Values are percentages


28 y.o. - Menometrorrhagia

• LMP = 9/01/15 (Study on 9/08/15)
• BC: Pills
• Surgery: None
• BMI = 69

**Pathology**

**ENDOMETRIUM, BIOPSY:**  
- Simple glandular hyperplasia without cytologic atypia.

**PCO and Endometrial Cancer**

- Chronic anovulation  
  - RR = 3.1 (1.1 – 7.3)\(^1\)  
- Obesity  
  - RR = 2.6 to 3.0\(^2\)


**Endometrial CA and Age < 45**

<table>
<thead>
<tr>
<th>BMI</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>Low (&lt;20)</td>
<td>5.3</td>
</tr>
<tr>
<td>Normal (20-25)</td>
<td>10.5</td>
</tr>
<tr>
<td>Overweight (25-30)</td>
<td>19.2</td>
</tr>
<tr>
<td>Obese (&gt;30)</td>
<td>71.0</td>
</tr>
</tbody>
</table>


**24 y.o. with Oligomenorrhea/ Menorrhagia**

- G0  
- Long-standing oligomenorrhea, now with menorrhagia  
- BMI 73.2 kg/m\(^2\)
Endometrial Biopsy

- Well-differentiated adenocarcinoma of the endometrium

Endometrial Evaluation

Histologic Evaluation

- Options
  - Endometrial biopsy
  - Dilatation and curettage
  - Diagnosis best made by tissue biopsy
    - Hormonal dysregulation
    - Endometritis
    - Endometrial hyperplasia
    - Diffuse malignancy

Postmenopausal Bleeding

- 58 yo G1P1001 with persistent postmenopausal bleeding
- Endometrial biopsy x 3
  - Tissue insufficient for diagnosis
Pipelle endometrial sampling. Sensitivity in the detection of endometrial cancer.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>#</th>
<th>Sens</th>
<th>Journal</th>
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<tbody>
<tr>
<td>Zorlu</td>
<td>1994</td>
<td>26</td>
<td>95%</td>
<td>Gyn Ob Invest</td>
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<tr>
<td>Stovall</td>
<td>1991</td>
<td>40</td>
<td>97.5%</td>
<td>Obstet Gyn</td>
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<tr>
<td>Guido</td>
<td>1995</td>
<td>65</td>
<td>83%</td>
<td>J Reprod Med</td>
</tr>
<tr>
<td>Van den Bosch</td>
<td>1995</td>
<td>140</td>
<td>44.6%</td>
<td>Obstet Gyn</td>
</tr>
</tbody>
</table>

Evidence: II-1


A comparison of Pipelle device and the Vabra aspirator

25 Patients scheduled for hysterectomy
- Percent surface area sampled
  - Pipelle 4.2% ± 0.92%
  - Vabra Aspirator 41.6% ± 5.7% (p<0.0001)
- Mean number of quadrants sampled (4 ant/4 post)
  - Pipelle 2.4 ± 0.41
  - Vabra aspirator 7.4 ± 0.42 (p < 0.0001)

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- Mean number of quadrants sampled
  - Pipelle: 2.4 ± 0.41
  - Vabra aspirator: 7.4 ± 0.42 (p<0.0001)


How should we investigate women with postmenopausal bleeding?

76 Postmenopausal women

- Pipelle in outpatient clinic
- TVS prior to outpatient hysteroscopy/D&C
  - Abnormal: Endometrial thickness > 5 mm
- Hysteroscopy and Curettage


How should we investigate women with postmenopausal bleeding?

- Pipelle
  - Successful: 70%
  - Sensitivity: 70%
- TVS
  - Sensitivity: 83%
  - Specificity: 77%
  - Positive predictive value: 54%
  - Detected 5 ovarian tumors
    - (3 missed on pelvic exam, 2 malignant)


Postmenopausal Bleeding

- 61 yo G3P1021 with postmenopausal bleeding
  - Spotting x 2 months

Papillary serous cystadenocarcinoma

Postmenopausal Bleeding

- 63 yo G2P1011 with postmenopausal bleeding
  - For 3 days
  - 3 weeks ago
3.9 mm

Endometrial thickness < 5 mm
- 82% could have a biopsy performed
- 27% had adequate tissue
- 73% had TIFD

ACOG Committee Opinion, Number 440, August 2009

Initial evaluation may be with either EMB or TVS
- Endometrial thickness > 4 mm should trigger further evaluation
  - EMB
  - Sonohysterography
  - Hysteroscopy
- EMB with TIFD requires additional evaluation

Endometrial Thickness and Postmenopausal Bleeding

<table>
<thead>
<tr>
<th>Reference</th>
<th>ET (mm)</th>
<th>#</th>
<th># CA</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlsson 1995</td>
<td>≤ 4</td>
<td>1168</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Ferrazzi 1996</td>
<td>&lt; 4</td>
<td>930</td>
<td>2</td>
<td>99.8</td>
</tr>
<tr>
<td></td>
<td>&lt; 5</td>
<td>4</td>
<td></td>
<td>99.6</td>
</tr>
<tr>
<td>Gull 2000</td>
<td>&lt; 4</td>
<td>163</td>
<td>1</td>
<td>99.4</td>
</tr>
<tr>
<td>Epstein 2001</td>
<td>≤ 5</td>
<td>97</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Gull 2003</td>
<td>≤ 4</td>
<td>394</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Risk of Cancer = 1/917

Postmenopausal Bleeding
- Endometrium = 3.9 mm
- Option A
  - No further bleeding
- Option B
  - Repeat episode of bleeding 8 months later

Can Ultrasound Replace D&C?
- 394 postmenopausal women referred for PMB (1987-1990)
- Menopausal if > 1 year w/o bleeding
- Ultrasound and D&C
- 10 year follow-up (n = 339)

 Göteborg, Sweden
Recurrent PMB - None

<table>
<thead>
<tr>
<th>Endometrial Thickness</th>
<th>#</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 4 mm</td>
<td>134</td>
<td>0</td>
</tr>
<tr>
<td>5-7 mm</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 8 mm</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Unmeasurable</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>191</td>
<td>0</td>
</tr>
</tbody>
</table>


Recurrent PMB - Yes

<table>
<thead>
<tr>
<th>Endometrial Thickness</th>
<th>#</th>
<th>CA</th>
<th>Hyper</th>
<th>CA or Hyperp</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 4 mm</td>
<td>28</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5-7 mm</td>
<td>9</td>
<td>3</td>
<td>11.1%</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 8 mm</td>
<td>28</td>
<td>4</td>
<td>14.3%</td>
<td>9</td>
</tr>
<tr>
<td>Unmeasurable</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>66</td>
<td>7</td>
<td>12.1%</td>
<td>15</td>
</tr>
</tbody>
</table>

Sonohysterography

38 y.o. G2P1011

- c/o of irregular and heavy bleeding
- Myomectomy 2009
- Hysteroscopic myomectomy 10/11/10
- C-section x 1
Sonobiopsy

- Evacuate fluid from catheter and syringe prior to biopsy
- Can be done with ultrasound guidance
- Withdraw the ultrasound probe prior to doing biopsy with Goldstein sonobiopsy catheter
Endometrial Aspiration at SIS

Age > 50

- 603 patients
- Indication
  - PMB 73.8%
  - Thickened endometrium 15.3%
  - Suspected polyp 9.3%
  - Abnormal Pap 1.7%


Endometrial Aspiration at SIS

- Simultaneous
  - Endometrial aspiration in all cases
- Sequential
  - Endometrial aspiration only if SIS is abnormal
    - Polyps
    - Focal lesion
    - Thickened endometrium


Endometrial Aspiration at SIS

If proliferative endometrium = Normal
- Screen positive = surgery 4.5%
- Missed hyperplasia or cancer 13.3%

If proliferative endometrium = Abnormal
- Screen positive = surgery 13%
- No missed hyperplasia or cancer


Conclusions

- Ultrasound is a reasonable first step in evaluation in patients with AUB
- ~ 1/3 will have an endometrial polyp or submucous myoma regardless of age

Conclusions

- Consider coagulopathies in patients based on historical information
- Consider endometrial biopsy as first-line evaluation in obese patients with long-standing oligo/amenorrhea

Conclusions: PMB

Endometrial Thickness < 4

- TVS endometrial thickness < 4 mm is a reasonable threshold to avoid initial endometrial biopsy or SIS
- Recurrent abnormal vaginal bleeding requires further evaluation
Conclusions:
Proliferative Endometrium

- Postmenopausal bleeding
- Proliferative endometrium on EMB may be abnormal
- May warrant further evaluation

Thank You

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