Emergency use of First Trimester Pelvic Ultrasound

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Why Do ED Ultrasound in the First Trimester?

- Evaluation of Patients at risk for Ectopic Pregnancy

  - Fetal cardiac activity
  - Gestational age estimate

What We Will Cover Today

- Brief review of the evaluation of patients with possible ectopic pregnancy
- The process
- The findings

Ectopic Pregnancy – Brief Review

- 1-2% of all pregnancies - estimated
- 10% of first trimester bleeding/pain to ED
- Leading cause of first trimester maternal morbidity and mortality
- Major contributor to maternal infertility
Ectopic Pregnancy – Brief Review

- Symptoms - amenorrhea, pain, bleeding (usually due to spontaneous abortion)
- Risk Factors (hx PID, tubal surgery, IUD, previous ectopic): absent in @48% of women
- Physical Exam - vital signs, os and vaginal contents
- Lab findings - Beta hCG more on this...
- Ultrasound consult - primary diagnostic tool

β–hCG & US findings

<table>
<thead>
<tr>
<th>Gest age</th>
<th>β-hCG (mlU)</th>
<th>TVS</th>
<th>TAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3w</td>
<td>20 - 50 (+ urine hCG)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 w</td>
<td>1000-2000</td>
<td>Gest Sac</td>
<td></td>
</tr>
<tr>
<td>5-6 w</td>
<td>&gt;2000</td>
<td>Yolk Sac</td>
<td>Gest sac</td>
</tr>
<tr>
<td>6 w</td>
<td>&gt;5000</td>
<td>Embryo</td>
<td>Yolk sac</td>
</tr>
<tr>
<td>6w</td>
<td>&gt;10,000</td>
<td>Cardiac activ.</td>
<td>Embryo</td>
</tr>
<tr>
<td>6-8 W</td>
<td>~100,000 peak</td>
<td></td>
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Discriminatory zone

Quantitative B–hCG

- Don’t let the radiologist or obgyn try to dissuade you from further workup simply because the B-hCG is low!!

### ED Physicians Performing Ultrasound for First Trimester Symptoms

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>IUP</td>
<td>70%</td>
</tr>
<tr>
<td>Indeterminant</td>
<td>20%</td>
</tr>
<tr>
<td>Embryonic demise</td>
<td>8%</td>
</tr>
<tr>
<td>EP</td>
<td>2%</td>
</tr>
<tr>
<td>Molar preg</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Demise</td>
<td>~50%</td>
</tr>
<tr>
<td>IUP</td>
<td>~30%</td>
</tr>
<tr>
<td>EP</td>
<td>15%</td>
</tr>
<tr>
<td>Unknown</td>
<td>3%</td>
</tr>
</tbody>
</table>

N = 1490 pts w/ 1st trimester symptoms


#### Meta analysis of over 2000 Emergency Physician Pelvic Ultrasound (40% in community practice) showed Sensitivity 99.2%, NPV 99.96%.


### Final Diagnosis

- When IUP doesn’t rule out EP
- Incidence of heterotopic pregnancy
  - Spontaneous pregnancy 1/8000 - 30,000
  - IVF 1/100

### Questions?
Transabdominal sonography (TAS)

- Abdominal probe
- Full bladder
- Larger field of view (vs. TVS)
- Initial view of choice
  - Shows IUP > 5-6 weeks
  - Shows big picture
  - Pelvic fluid
  - Often obviates TVS

Transverse TAS

Transverse TAS

Endometrial Stripe
Sagittal TAS

- Endometrial stripe caused by opposed mucosa
- Position varies with bladder filling (or if retroverted)
- Easier to see cul-de-sac (pouch of Douglas)

Transvaginal sonography

- Intracavitary probe
- Empty bladder
- Close-up view
- Optimal imaging of:
  - Endometrium
  - Myometrium
  - Cul-de-sac
  - Ovaries
TVS

- Best performed following the pelvic exam
- A nearly empty bladder is required for an optimal endovaginal (EV) exam
- A full bladder:
  - Displaces the anatomy beyond the focal length of the transducer
  - Will create artifacts that compromise imaging

Before Performing TVS

TVS sagittal orientation

TVS sagittal orientation
Sagittal TVS uterus long view

Interrogating the uterus
1. Identify endometrial stripe
2. Keep probe marker pointed anterior
3. Sweep from cornu to cornu
4. Look for GS /YS

TVS Transverse (coronal) Orientation

TVS coronal orientation
Coronal TVS

1. Position uterus in center of screen
2. Slice uterus like a loaf of bread
3. From top of fundus to cul-de-sac
4. Look for GS / YS

Coronal TVS interrogating the uterus

Questions?

Endometrial stripe
Trans-Absdominal (Through Bladder)
**Gestational Sac**

- Anechoic area within the uterus surrounded by two echogenic rings
  - Decidua vera (the outer ring)
  - Decidua capsularis (the inner ring)
- Called **double decidual sac sign**
- Versus pseudo gestational sac of EP

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**Yolk Sac**

- Earliest definitive IUP sign
- Visualized by TVS @ 4-5 wks, B-hCG >1500
- Thin echoic ring (sphere) within the GS
- Readily seen when GS sac is > 10 mm
Are you sure?? – Be sure before you call IUP!!

Embryo (fetal pole)

- Visible by TVS when 2 mm in size
- Thickened area adjacent to the yolk sac
- CRL at this stage accurately predicts gestational age
Abnormal Sac

24 mm

Ectopic pregnancy

Empty uterus + complex mass

SAB / products of conception

Free pelvic fluid - normal
Free Fluid in Cul de Sac

- Posterior to the uterus and cervix
- Spikey contours
- Empty uterus + cul-de-sac fluid $\rightarrow$ suspect EP

Free pelvic fluid - abnormal

Massive hemoperitoneum from EP

Always assess RUQ view in suspected EP
Pitfalls

- Relying on gestational sac alone to confirm IUP
  - Use yolk sac
  - Beware of pseudogestational sac
- Being reassured by B-hCG < 1500
  (low hCG does not mean “low risk” for EP)
- Performing TVS without TAS
  - Can miss the big picture (free fluid)