first trimester ultrasound
transabdominal and transvaginal ultrasound

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LECTURE GOALS

• Review indications

• Transabdominal and transvaginal pelvic imaging anatomy

• Transabdominal and transvaginal pelvic scanning protocols

• Image Review

• Pitfalls
Indications

who and when to scan
Indications
who and when to scan

Female Patients
INDICATIONS
WHO AND WHEN TO SCAN

• Goal Directed
• Is there an Intrauterine Pregnancy?
  - Yes, threatened AB instructions and discharge
  - No

• Hemodynamically stable -
  • formal scanning, GYN consultation

• Hemodynamically unstable -
  • FAST exam, prep for OR for ruptured ectopic
INDICATIONS

DEFINITION OF INTRAUTERINE PREGNANCY

• Intrauterine heart beat
• Fetal Pole
• Yolk Sac

NOT gestational sac, double decidual sign or IVF patients.
INDICATIONS

DEFINITION OF INTRAUTERINE PREGNANCY

IUP effectively rules out ectopic in the ED

- Exception: heterotopic pregnancy with IVF
  - 1:30,000 low-risk pregnancies
  - 1:7000 pregnancies involving assisted reproductive technology
Makes your patient care better
transabdominal imaging
Grey’s Anatomy with permission
transabdominal pelvic imaging

• Always easier with a full bladder
• Use 2.5 - 5 Mhz abdominal probe

• Longitudinal scanning - **fan side to side**
• Transverse scanning - **fan up and down**
Transabdominal imaging anatomy
longitudinal scanning planes

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Transabdominal imaging anatomy
longitudinal scanning planes

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Transabdominal imaging anatomy
transverse scanning planes
Transabdominal imaging anatomy
transverse scanning planes
yolk sac:
sac within a sac
heart beat

M-mode, zoom function

146 bpm
No pulse doppler in first trimester
interstitial / cervical ectopic pregnancy: 2-5% of all ectopics

Myometrial mantle: 8 mm
MEASURE HERE
myometrial mantle
8 mm minimum
Transabdominal Pelvic Scanning Protocol

Female patient
- Hemodynamically unstable
  - FAST exam
    - + fluid
      - OR
    - - fluid
      - Other source of hypotension
- Hemodynamically stable
  - Transabdominal US
    - -
    - +
      - IUP and home
  - Transvaginal US
what does pelvic US add?

Higher specificity

<table>
<thead>
<tr>
<th></th>
<th>TA</th>
<th>TV</th>
<th>Hcg level</th>
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<tbody>
<tr>
<td>Gestational Sac</td>
<td>5.5 – 6 weeks</td>
<td>4.5 – 5 weeks</td>
<td>1700-6000</td>
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<td>Yolk Sac</td>
<td>6 – 6.5 weeks</td>
<td>5 – 5.5 weeks</td>
<td>8000-15000</td>
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<tr>
<td>Fetal Pole</td>
<td>7 weeks</td>
<td>5.5 – 6 weeks</td>
<td>13000-15000</td>
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<tr>
<td>Cardiac Activity</td>
<td>7 weeks</td>
<td>6 weeks</td>
<td>16000-25000</td>
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<td>Fetal parts</td>
<td>&gt; 8 weeks</td>
<td>8 weeks</td>
<td>29000-39000</td>
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transvaginal scanning

When transabdominal nondiagnostic...
transvaginal pelvic imaging

- Always easier with an empty bladder
- Use high frequency intracavitary probe

- Longitudinal scanning - **fan side to side**
- Transverse scanning - **fan up and down**
transvaginal imaging preparation
longitudinal scanning planes

- Hold probe with marker to ceiling
- Longitudinal or sagittal scanning
- Fan side to side
transvaginal imaging anatomy
longitudinal scanning planes
transvaginal imaging anatomy
longitudinal scanning planes

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transvaginal imaging anatomy
longitudinal scanning planes

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transvaginal imaging anatomy
transverse scanning planes

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transverse scanning planes

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transverse scanning planes

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Ovaries

- Lie *anterior* to internal iliac vessels
- Lie *medial* to external iliac vessels
- Lie *lateral* & *posterior* to body uterus

- Discrete, hypoechoic structures
- Peripheral, multiple, scattered anechoic follicles
  - 3 cm long axis, 2 cm AP and transverse

- Better seen on transvaginal scanning
ovarian cysts

• Simple cysts
  - Thin walled
  - Spherical
  - Without internal echoes or septations
  - Posterior enhancement
  - Cysts > 5 cm at risk for torsion

• Complex cysts
  - Complex cysts are those which do not meet the above criteria
  - Require repeat follow-up US in 4-6 weeks time
Simple Ovarian Cyst
Complex Ovarian Cyst
Corpus luteal cysts

- dominant follicle
- retain fluid for 4-5 days (approx 2-3 cm)
- has a rich blood supply
- if no pregnancy, CL will gradually atrophy (2 weeks)
- if pregnancy occurs, CL will remain, reach max size at 8-10 weeks, & regress by 16 weeks

• Common cause of abdominal pain
  - simple vs. complex (hemorrhagic)
  - rupture, torsion
• Must be distinguished from ectopic pregnancy
• CL cysts are continuous & move together with ovary
Transvaginal Pelvic Scanning
Protocol

Transvaginal scan

- IUP
- Discharge

HCG level < 1000

- Hemodynamically stable
  - Follow up in 48 hours
  - Home with ectopic precautions

All others, formal scan, consult
transvaginal pelvic scanning protocol

• Empty uterus and free fluid
• + hcg
• Greater than 1/3 of pouch of Douglas toward fundus

• very suspicious for ectopic
image review
Subchorionic hemorrhage
Ectopic Pregnancy
• If not sure you can use color doppler to look for ring of fire

• Absence does not rule out ectopic
Cornual Ectopic
First trimester scanning pitfalls

- Failing to fan side to side and up and down throughout uterus
- Missing abnormal free fluid
- Large ovarian cysts
- Corpus luteal cysts for ectopic
- Overcalling gestational sac
Pitfall Case #2
Pitfall Case #3
questions?

Thank you.