AMSER Case of the Month:

32 year old G1P0 with colicky RUQ pain

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Patient Presentation

• G1P0 at 28w5d with colicky RUQ pain lasting 1 week, now with 10/10 exacerbations, occurring mostly after eating
  - Radiates to R and L upper quadrants
  - Nausea, dry heaving but no vomiting
  - Last BM 4 days ago

• PMH: Chronic Constipation, GERD, Gastric Ulcer (at age 19) related to NSAID use

• Exam:
  - Mild tenderness throughout abdomen, worse in epigastrium and RUQ. Positive Murphy’s sign. No rebound or guarding.
  - Cervical exam unremarkable
Pertinent Labs

- Mild Leukocytosis: WBC 11.4
- Elevated Lipase (169) that proved to be transient or spurious
- LFTs WNL
- Cr: 0.73
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>US abdomen</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>CT abdomen with IV contrast</td>
<td>May Be Appropriate</td>
<td>🌟🌟🌟🌟</td>
</tr>
<tr>
<td>MRI abdomen without and with IV contrast with MRCP</td>
<td>May Be Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>MRI abdomen without IV contrast with MRCP</td>
<td>May Be Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>Nuclear medicine scan gallbladder</td>
<td>May Be Appropriate</td>
<td>🌟🌟</td>
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<tr>
<td>CT abdomen without IV contrast</td>
<td>May Be Appropriate</td>
<td>🌟🌟🌟</td>
</tr>
<tr>
<td>CT abdomen without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>🌟🌟🌟🌟</td>
</tr>
</tbody>
</table>

This imaging modality was ordered by the Obstetrician.
Ultrasound Findings

- No sonographic evidence of cholelithiasis or acute cholecystitis.

- Mild R hydronephrosis which persisted on postvoid imaging, felt likely due to distal ureteral compression from gravid uterus. No visualized shadowing renal calculi.

**Note:** MRI and CT were ordered to evaluate for appendicitis as cecum often migrates to RUQ during pregnancy. CT ordered after MRI failed to visualize appendix.
MRI

Ax SSFPE FATSAT

L Ovarian Vein
Normal caliber with what proved to be artifact centrally

R Ovarian Vein
Expanded with what proved to be thrombus centrally

Imaging: Labeled

CT w/ Contrast

L Ovarian Vein
(patent)

R Ovarian Vein
(thrombosed)

Placenta
CT w/ Contrast (Unlabeled)

Coronal
CT w/ Contrast (Labeled)

Coronal

- L Ovarian Vein (Patent)
- R Ovarian Vein (Thrombosed)
- Fetal Skull within Gravid Uterus
Final Dx:
Antepartum Ovarian Vein Thrombosis
Ovarian Vein Thrombosis (OVT)

- Occurs in 1 out of every 600-2000 live births.
  - Antepartum: Incredibly rare – only 3 cases found in scientific literature search
- Most common vein for puerperal pelvic thrombophlebitis, R>L
- Likely occurs secondary to hypercoagulable peripartum state
- Presenting Symptoms:
  - Almost always presents as post-partum fever; abdominal, flank or back pain
  - GI sx are rare or mild, which can help differentiate from GI/GU pathology
- Imaging Findings:
  - CT or MRI are the imaging modalities of choice
  - Ultrasound is not reliable for ovarian vein visualization
OB Patient Follow-Up

• Pain resolved on HD#2 (unclear whether OVT was a definitive etiology for her pain)
• On HD#3 discharged home on therapeutic Lovenox to be continued through pregnancy and 6 weeks postpartum
  • Lovenox was not held during labor
• Induction of labor at 37w2d for Intrauterine Growth Restriction
  • Uncomplicated SVD delivery, APGARS 8 and 9
  • No bleeding issues
  • IGR unlikely to have been related to CT-associated radiation exposure (next slide provides rationale)
Radiation in Pregnancy

• Radiation dose for an abdominal/pelvic CT (and thus for this patient) - approximately 10 mSv (equivalent to approximately 10mGy)

• Radiation effects are based on gestational age

• Threshold dosage that can result in possible effects for the fetus vary throughout pregnancy

• It is important to discuss the risks of radiation compared to the benefit with pregnant patients

Table 2. Effects of Gestational Age and Radiation Dose on Radiation-Induced Teratogenesis

<table>
<thead>
<tr>
<th>Gestational Period</th>
<th>Effects</th>
<th>Estimated Threshold Dose*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before implantation (0-2 weeks)</td>
<td>Death of embryo or no consequence</td>
<td>50–100 mGy</td>
</tr>
<tr>
<td>after fertilization</td>
<td>(all or none)</td>
<td></td>
</tr>
<tr>
<td>Organogenesis (2-8 weeks)</td>
<td>Congenital anomalies (skeleton, eyes,</td>
<td>200 mGy</td>
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<tr>
<td>after fertilization</td>
<td></td>
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<tr>
<td>Fetal period</td>
<td>Severe intellectual disability (high risk)¹</td>
<td>60–310 mGy</td>
</tr>
<tr>
<td>8–15 weeks</td>
<td>Intellectual deficit</td>
<td>25 IQ-point loss per 1,000 mGy</td>
</tr>
<tr>
<td></td>
<td>Microcephaly</td>
<td>200 mGy</td>
</tr>
<tr>
<td>16–25 weeks</td>
<td>Severe intellectual disability (low risk)¹</td>
<td>250–280 mGy</td>
</tr>
</tbody>
</table>

*Data based on results of animal studies, epidemiologic studies of survivors of the atomic bombings in Japan, and studies of groups exposed to radiation for medical reasons (eg, radiation therapy for carcinoma of the uterus).

¹Because this is a period of rapid neuronal development and migration.


ACOG Committee Opinion no. 723: Guidelines For Diagnostic Imaging During Pregnancy and Lactation
References:

1. ACR Appropriateness Criteria [https://acsearch.acr.org/list](https://acsearch.acr.org/list)
3. ACOG Committee Opinion no. 723: Guidelines For Diagnostic Imaging During Pregnancy and Lactation
4. Simons GR, Piwnica-Worms DR, Goldhaber SZ, Ovarian Vein Thrombosis
5. Bertsch NM, Mastrobattista, Kawashima A, Kramer LA, Antepartum Bilateral Ovarian Vein Thrombosis: Magnetic Resonance Imaging Diagnosis