Abdominal pain in Pregnancy

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Abdominal pain in Pregnancy

• Very common
• Approximately 1 in 500-635 pregnant women will require non-obstetric abdominal surgery during their pregnancies

Abdominal pain during pregnancy

• Incidence
• Etiology
• Workup
  – History, physical examination
  – Imaging
• Treatment
• Outcome

Causes of abdominal pain in pregnancy

<table>
<thead>
<tr>
<th>Non-obstetric</th>
<th>Obstetric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendicitis</td>
<td>Ruptured ectopic pregnancy</td>
</tr>
<tr>
<td>Cholecystitis</td>
<td>Preterm labor</td>
</tr>
<tr>
<td>Bowel obstruction</td>
<td>Abruptio placenta</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Chorioamnionitis</td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>Adnexal torsion</td>
</tr>
<tr>
<td>Urinary calculi</td>
<td>Ectopic/heterotopic pregnancy</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>Pelvic inflammatory disease</td>
</tr>
<tr>
<td>Acute mesenteric adenitis</td>
<td>Round ligament pain</td>
</tr>
<tr>
<td>Acute mesenteric ischemia necrosis</td>
<td>Uteroovarian vein rupture</td>
</tr>
<tr>
<td>Rectus hematoma</td>
<td>Myomatous red degeneration</td>
</tr>
<tr>
<td>Perforated duodenal ulcer</td>
<td>Uterine rupture</td>
</tr>
<tr>
<td>Meckel’s diverticulum</td>
<td>Rupture of uterine AVM</td>
</tr>
<tr>
<td>Tuberculosis peritonitis</td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Acute intermittent porphyria</td>
<td></td>
</tr>
</tbody>
</table>

Colemen et al, Am J Obst Gynecol, 1997
Kammerer et al, Med Clin North Am, 1979
SAGES guidelines, 2008
Abdominal pain in pregnancy: Work-up

• History
• Physical examination
• Imaging studies

The Physiologic changes of Pregnancy

• CV: “physiologic anemia of pregnancy”
• RESP: Increase in minute ventilation, airway edema
• GU: dilated urinary collecting system
• ID: relative leukocytosis (10-20K)
• GI: decreased transit time, anorexia, nausea, vomiting

The Anatomic changes of Pregnancy

More horizontal stomach
Transverse colon pushed up
Small intestines displaced in upper quadrants
Ascending and descending Colon pushed towards flanks

Abdominal pain in pregnancy: The History

• Similar to that of a non-pregnant patient, with an emphasis on asking patient to differentiate symptoms from those in normal pregnancy
  – Nausea, vomiting, constipation, urinary frequency, abdominal discomfort all common during pregnancy
• Establish gestational age
Physical exam during pregnancy

- Findings may be less prominent
- Peritoneal signs can be decreased/absent due to lifting, stretching of the anterior abdominal wall
- Consider examination in the decubitus position
- Recall anatomic alterations during pregnancy
- Fetus
  - Independent viability? (23-25wks gestation)
    - No: documentation of presence or absence of fetal heart tones
  - Yes: more thorough evaluation by OB is required. Monitor fetal heart rate and uterine tone continuously.

Laboratory studies

- Many commonly used lab tests have altered reference ranges during pregnancy
  - WBC (can be elevated 6-16k in 2-3rd trimester, and 20-30k in early labor
  - UA pyuria common

The Acute Abdomen in Pregnancy

1. Appendicitis
2. Cholecystitis
3. Bowel obstruction
4. Pancreatitis (Non-obstetric)

Acute appendicitis during Pregnancy

- Most common non-obstetric cause of acute abdomen
- 1:500 to 1:2000 pregnancies
- Same incidence as that in non-pregnant women
- Occurs in all trimesters
- Lower fetal mortality rates when dx’d/tx’d within 24hrs

Taylor and Perry, Acute abdomen and Pregnancy, emedicine 2009

Ohta, JCEM 2003
Mazze, Obstet Gynecol 1991
Acute appendicitis during Pregnancy

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Incid</th>
<th>~Appy</th>
<th>Perf</th>
<th>Fetal mort</th>
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</thead>
<tbody>
<tr>
<td>Mazze et al</td>
<td>1991</td>
<td>778</td>
<td>1:936</td>
<td>36%</td>
<td>6%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Uebermueck et al</td>
<td>2004</td>
<td>94</td>
<td>1:499</td>
<td>23%</td>
<td>15%</td>
<td>7%</td>
</tr>
<tr>
<td>Tamir et al</td>
<td>1990</td>
<td>84</td>
<td>-</td>
<td>18%</td>
<td>27%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Anderson et al</td>
<td>1999</td>
<td>56</td>
<td>1:766</td>
<td>25%</td>
<td>-</td>
<td>7.1%</td>
</tr>
</tbody>
</table>

Overall perforation rate approximately 25%

Acute appendicitis during Pregnancy

• Abdominal pain, nausea and vomiting almost always present
• Anorexia less common
• Abd tenderness is in the RLQ in the first trimester, and in the RLQ, right periumbilical region or RUQ later in pregnancy

• Displacement of the appendix by gravid uterus
• Altered location of the somatic component
• Variable cecal fixation

(Baer, JAMA 1932)

(Baer, JAMA 1932)
Imaging techniques during pregnancy

- Ultrasound
- CT scan
- MRI

Ultrasound - Appendix

- Most frequently used imaging study
- Safe
- Maternal gallbladder, kidneys, pancreas
- Graded compression used to evaluate the appendix
- Establish gestational age, fetal well-being
- Low specificity

Computed Tomography

- Excellent cross-sectional imaging
- High sensitivity and specificity
- Radiation concerns

Radiation exposure during pregnancy

Tetra
genic vs. Carcinogenic

Gray(Gy): A SI unit of absorbed dose
One Gy=100rads, One mGy=1/1000Gy
Recognized teratogenetic effects

- Microcephaly, microphthalmia
- Mental retardation, behavioral defects
- Growth retardation
- Cataracts

Exposure of the pregnant patient to diagnostic radiations: a guide to medical management. Lippincott 1985; 19-223

Threshold for teratogenesis

- Estimated threshold dose: 5 - 15 rad
- Dose from standard pelvic CT: 5 - 10 rad
- No detected increase in human studies

AJR 1996; 167: 1377-1379
Radiology 1986; 159: 787-792
Br J Radiol 1987; 60: 17-31

Radiation exposure during Pregnancy

Carcinogenesis

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline risk of childhood cancer (0-15 yrs)</td>
<td>19/10,000</td>
</tr>
<tr>
<td>Excess risk per rad of fetal whole body dose</td>
<td>4.6-6.4/10,000</td>
</tr>
<tr>
<td>Relative risk of childhood cancer after 5 rad</td>
<td>2</td>
</tr>
</tbody>
</table>

UNSCEAR 1972 Report to the UN General Assembly
National Radiological Protection Board, 1993: 15-157
Thrombosis and Haemostasis 1989; 61: 189-196
MRI safety

- MRI >> ionizing radiation
- Good indication: Benefit >> risk
- High sensitivity and specificity
- FDA guidelines:
  - “Safety of MRI not established for the fetus”
  - Avoid gadolinium-based contrast
- Availability after hours??

MRI for appendicitis in pregnancy

- Beth Israel study of 51 suspected cases:
  - Mean gestational age of 20 weeks (range, 4-38)
  - Oral Gastromark/Readi-Cat mix (dark on T1 & T2)
  - Three planes of SSFSE
- Sensitivity of 100%, specificity of 93.6%
  - Only 4 “proven” appendicitis (3 surgical, 1 CT)
  - Gestational ages of 13, 20, 27, and 31 weeks

Radiation exposure during pregnancy

- CT and pregnancy:
  - Teratogenesis unlikely at diagnostic doses
  - Carcinogenesis is a real risk
- MRI and pregnancy:
  - No proven risk, but avoid first trimester studies
  - MRI has several useful obstetric applications
- Contrast and pregnancy:
  - Iodinated contrast is (probably) safe
  - Gadolinium is (relatively) contraindicated

Acute appendicitis during Pregnancy: Treatment

- Surgical
  - Open vs laparoscopic?
Laparoscopic Surgery during Pregnancy

**Theoretical concerns**

- Trocar injury
- CO2 pneumoperitoneum
  - fetal acidosis
  - decreased uterine blood flow

**Guidelines for laparoscopic surgery during pregnancy**

- Protect uterus with lead shield if IOC is a possibility
- Obtain abdominal access with an “open technique”
- Shift the uterus off the inferior vena cava
- Minimize pneumoperitoneum pressures to 8-12mm Hg

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Table 1. Patients and Results

<table>
<thead>
<tr>
<th>Patient</th>
<th>Length of pregnancy</th>
<th>Diagnosis</th>
<th>Operation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>28</td>
<td>Acute cholecystitis</td>
<td>Laparoscopic cholecystectomy</td>
<td>Vaginal delivery at 35.5 wk</td>
</tr>
<tr>
<td>28</td>
<td>24</td>
<td>Acute cholecystitis</td>
<td>Laparoscopic cholecystectomy</td>
<td>Vaginal delivery at 45 wk</td>
</tr>
</tbody>
</table>

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Laparoscopic port placement

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[Rizzo, ILAST 2003]


Guidelines for laparoscopic surgery during pregnancy

- Preoperative obstetrical consultation
- When possible, operation should be deferred until the 2nd trimester, when fetal risk is lowest
- Use pneumatic compression devices
- Monitor maternal end tidal CO2/blood gases

www.sages.org
Society of American Gastrointestinal and Endoscopic Surgeons, rev 2008

Acute cholecystitis during Pregnancy

- 2nd most common non-obstetric cause of acute abdomen
- 1:1600 to 1:10,000 pregnancies
- Same incidence as that in non-pregnant women
- Occurs in all trimesters


Acute cholecystitis in Pregnancy

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Comparison of outcome after nonoperative management versus operative management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonoperative management (n = 55)</td>
</tr>
<tr>
<td>Premature contractions</td>
<td>18 (33%)</td>
</tr>
<tr>
<td>Induced labor for treatment</td>
<td>14 (22%)</td>
</tr>
<tr>
<td>Cesarean section for treatment</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>11 (17%)</td>
</tr>
<tr>
<td>Refuse before delivery</td>
<td>22 (34%)</td>
</tr>
<tr>
<td>Maternal mortality</td>
<td>0</td>
</tr>
</tbody>
</table>


Medical versus surgical management of biliary tract disease in pregnancy


- Retrospective study, 1992-2002
- UCSF, Stanford
- 76 patients with symptomatic cholelithiasis: all initially tx’d with IVF, bowel rest, narcotics, Abx where appropriate
  - 53 treated medically
  - 10 underwent surgery (refractory pain, worsening clinical status, or those in 2nd trimester)

Acute cholecystitis in Pregnancy

“This surgical management for symptomatic cholelithiasis is safe, reduces the need for labor induction, reduces the rate of preterm deliveries, and reduces fetal morbidity.”

Kirkwood et al, 2004

Bowel obstruction during Pregnancy

- 3rd most common non-obstetric cause of acute abdomen
- 1:1600 to 1:16,000 pregnancies
- Same incidence as that in non-pregnant women
- Occurs in all trimesters

Ballantyne, Am Surg 1985

Bowel obstruction during Pregnancy

- Adhesions-60-70%
- Volvulus –approaches 25%
  - Sigmoid
  - Cecal
- Intussusception, hernia, cancer rare

Beware of diagnosis of hyperemesis gravidarum in pts in their 2nd and 3rd trimester, who have had prior abdominal surgery

Acute pancreatitis during Pregnancy

- 1 in 1000-3000 pregnancies
- Caused most commonly by gallstones (67-100%), EtOH, hyperlipidemia
- Associated with a high rate of fetal mortality (up to 37%)
- Can occur in all trimesters, but most common in 3rd

Conclusions

1. Appendicitis, cholecystitis and bowel obstruction are the most common causes of the acute abdomen during pregnancy.

2. History and physical findings may be altered by physiologic/anatomic changes during pregnancy.

3. Consider imaging algorithm of ultrasound, then MRI, then CT, given small but real risk of childhood cancers.

4. Delays in diagnosis and treatment result in higher maternal and fetal loss.

5. Coordinated care between ED, Surgery, OB-GYN, Perinatology and Radiology is critical.

Thank you