General surgery emergencies in the pregnant patient

Postgraduate Course in General Surgery

General surgery emergencies in the pregnant patient

• Approximately 1 in 500-635 pregnant women will require non-obstetric abdominal surgery during their pregnancies
• Appendicitis and trauma are among the more common indications

The physiologic changes of pregnancy can make diagnosis more difficult

• 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

What is appropriate imaging?
• When is fetal monitoring needed?
• When do I call OB?
• When do I call Peds?
• How safe is a general anesthetic?
• Is laparoscopic surgery or open better?
The Anatomic changes of Pregnancy

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

Physical exam during pregnancy

- Findings may be less prominent
- Peritoneal signs can be decreased/absent due to lifting, stretching of the anterior abdominal wall
- Fetus
  - Independent fetal viability? (About 20-24 wks)
    - 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

- Recall that many commonly used lab tests have altered reference ranges during pregnancy

General Surgery emergencies during Pregnancy

- Appendicitis
- Trauma
- Cholecystitis
- Bowel obstruction
- Pancreatitis

Taylor and Perry, Acute abdomen and Pregnancy, emedicine 2009
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 diagnosed and treated within 24hrs

![Displacement of the appendix by gravid uterus](Baer, JAMA 1932)

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Incidence</th>
<th>Perf.</th>
<th>Peri.</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>
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<tr>
<td>Uebernueck et al</td>
<td>2004</td>
<td>94</td>
<td>1:499</td>
<td>23%</td>
<td>15%</td>
<td>7%</td>
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<tr>
<td>Tamir et al</td>
<td>1990</td>
<td>84</td>
<td>-</td>
<td>18%</td>
<td>27%</td>
<td>5.9%</td>
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<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>
**Ultrasound - Appendix**

- Normal - thin wall
- Increased blood flow
- Appendicitis

**Computed Tomography**

**MRI**

**Radiation exposure during pregnancy**

- Tetratogenic vs. Carcinogenic

Gray(Gy): A SI unit of absorbed dose
One Gy=100rads. One mGy=1/1000Gy

(Birchard, Am J Roet 2005)
Recognized teratogenic effects

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

Threshold for teratogenesis

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

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>
MRI safety

- Good indication: Benefit >> risk
- MRI >> ionizing radiation
- Avoid first trimester studies if possible, avoid gadolinium
- FDA guidelines:
  - “Safety of MRI not established for the fetus”
  - MRI < 0.4 W/kg
- Availability after hours??

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

Trauma during Pregnancy

- Leading non-obstetric cause of maternal death
- Most common cause are motor vehicle accidents, followed by violence/assaults, and falls
- Blunt trauma (84%) associated with placental abruption
- Penetrating trauma (16%) may cause direct fetal injury
- Even mild trauma may result in an increase in long-term adverse events (preterm labor, small for gestational age)

(Mediana 2006;42(7):586)

Trauma during Pregnancy

- Thorough assessment and resuscitation of the mother
- Maintenance of urethral perfusion and fetal oxygenation (avoidance of hypoxina, acidosis, hypothermia, hypotension)
- Clear understanding/documentation of gestational age and fetal viability, with fetal monitoring after viable
- Imaging as necessary
- Awareness of fetomaternal hemorrhage and need for Rh immune globulin

(Mediana 2006;42(7):586)
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
- High recurrence rate for complications of cholelithiasis with medical management

(Kammerer, Med Clin North Am 1979)

Acute cholecystitis in Pregnancy

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Nonoperative management (n = 65)</th>
<th>Operative management (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature contractions</td>
<td>18 (28%)</td>
<td>4 (31%)</td>
</tr>
<tr>
<td>Reduced labor for treatment</td>
<td>14 (22%)</td>
<td>0</td>
</tr>
<tr>
<td>Caesarean section for treatment</td>
<td>6 (9%)</td>
<td>0</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>11 (17%)</td>
<td>0</td>
</tr>
<tr>
<td>Refuse before delivery</td>
<td>22 (34%)</td>
<td>0</td>
</tr>
<tr>
<td>Maternal mortality</td>
<td>0</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)


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


Other causes of abdominal pain during pregnancy

- Pyelonephritis
- Urinary calculi
- Gastroenteritis
- Acute mesenteric adenitis
- Acute mesenteric ischemia necrosis
- Rectus hematoma
- Perforated duodenal ulcer
- Meckel’s diverticulum
- Tuberculosis peritonitis
- Pneumonia
- Acute intermittent porphyria
- Preterm labor
- Abruptio placentae
- Chorioamnionitis
- Adnexal torsion
- Ectopic/heterotopic pregnancy
- Pelvic inflammatory disease
- Round ligament pain
- Uteroovarian vein rupture
- Myomatous red degeneration
- Uterine rupture
- Rupture of uterine AVM

Is general anesthesia safe during pregnancy?

- Maternal death rate low, comparable to that of the non-pregnant patient
- Studies of babies of over 10 thousand pregnant women suggest birth defect rate of 2-3.9% after GA, also comparable to that of non-pregnant women
- Chance of miscarriage or fetal death 5.8% over all trimesters, 10.5% in the first trimester (much higher)
- Rate of premature labor 8.3%

(Cohen-Keren 2005, Duncan 1986)
Is laparoscopic surgery safe during pregnancy?

Laparoscopic surgery during pregnancy: theoretical concerns

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

Laparoscopic port placement

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 8-12 mm Hg
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

Conclusions

1. Appendicitis, trauma, cholecystitis and bowel obstruction are the most common reasons for non-obstetric operation in the pregnant patient
2. History and physical findings may be altered by physiologic/anatomic changes during pregnancy
3. Most medical imaging studies impart minimal teratogenic risk to the fetus, but impart a small, but real carcinogenic risk.
4. Fetal monitoring is indicated when fetus is independently viable (about 24 wks)
5. For trauma during pregnancy, fetal well-being is dependent on maternal well-being
6. Coordinated care is essential (Surgery, OB, ED, Radiology and Peds)
7. Delays in treatment may lead to higher maternal and fetal mortality
8. General anesthesia should be avoided during the first trimester if possible

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