Eastern Association for the Surgery of Trauma

27th Annual Scientific Assembly

Sunrise Session 02
The Pregnant Surgical Patient

January 15, 2014
Waldorf Astoria Naples
Naples, Florida

Emergency general surgery in pregnancy

EAST Scientific Assembly
Naples, FL
MOC Sunrise Session
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EPIDEMIOLOGY AND BACKGROUND OF SURGICAL DISEASE IN PREGNANCY

Scope of the problem

- 1/500 to 1/635 require nonOB surgery
- Appendicitis, cholecystitis, SBO
- Less common conditions
  - Ovarian mass, adrenal, splenic, hernia, IBD
- Appendicitis significant morbidity in preg
  - Relative risk of perforation 2-10 preg vs nonpreg
  - Fetal loss 1.5% nonperforated vs 20% perforated
- GS pancreatitis fetal loss of 10-60%

Gastroenterol Clin North Am, 27 (1998), p. 73

SIGNIFICANT PHYSIOLOGIC CHANGES IN PREGNANCY

Respiratory Changes

- Increased cardiac output/pulmonary blood flow
- Decreased oncotic pressure, pulmonary edema
- Increased progesterone leads to increased minute ventilation
  - Respiratory alkalosis with compensatory metabolic acidosis
- Decreased chest wall compliance leads to decreased FRC

Cardiovascular Changes

- Increased cardiac output
- Increased heart rate
- Increased blood volume
- Decreased SVR
- Decreased venous return

Gastrointestional Changes

- 70% experience nausea and vomiting
- Decreased lower esophageal spinchter tone
- Decreased gastric motility and emptying
- Hormones contribute to cholestasis
  - Estrogen causes decreased bile flow

Intubation

- Beware!
- Hypoxia and hypercapnia happen quickly
- High risk for aspiration

Hematologic changes

- Hypercoagulable
- Risk of thromboembolism doubles during pregnancy
- Leukocytosis

IMAGING AND DIAGNOSTICS FOR THE PREGNANT SURGICAL PATIENT

Estimated fetal radiation exposure

RADIOLOGIC STUDY	ESTIMATED FETAL DOSE * (cGy)
Chest radiograph (posteroanterior, lateral)	0.0002
Abdominal radiograph	0.1-0.3
Head computed tomography (CT)	0.0005
Chest CT	0.002-0.02
Abdominal CT	0.4-0.8
Abdominopelvic CT	2.5-3.5
Abdominopelvic CT (stone protocol)	1
Ventilation scan	0.007-0.05
Perfusion scan	0.04
Intravenous pyelography	0.6-1
Bone scan	0.3-0.5
Positron emission scan	1-1.5
Thyroid scan	0.01-0.02
Mammography	0.007-0.02
Small bowel series	0.7
Barium enema	0.7

Adopted from *Obstetrics: Normal and Problem Pregnancies*, 6th ed. 2012 Saunders/Elsevier, RAD=1 cGy

Fetal effects of radiation exposure by gestational age

- < 2 weeks
  - "all or none" phenomenon
  - Lethal dose of radiation 5-20 cGy
- 2-8 weeks
  - Fetus resistant to SAB
  - Harmful dose 20-50 cGy
- 8-15 weeks
  - High neurologic susceptibility
  - Harmful dose 6-50 cGy
- 16-25 weeks
  - Remains at risk of neurologic/brain injury
  - Harmful dose 25-150 cGy
- >25 weeks
  - Fetus is resistant to radiation induced abnormality

Other considerations

- Risk/benefit of test vs missed diagnosis
- Must be familiar with exposures of tests
- Unclear link between radiation/malignancy after in utero exposure
- Use alternate tests/shield if possible
- Vast majority dx radiology below harmful level
- Exposure limited to 5-10 rads in first 25 weeks

Ultrasound

- First-line imaging in abdominal pain
- May be useful for appendicitis
  - Sens 94%, spec 97%, PPV 95%, NPV 95 for kids*
  - Numbers
- First line test for biliary disease
- Transvaginal for adnexal pathology
  - Less after first trimester, cephalad displacement

*J Peds Surg, 47(12) Dec, 2268-2272

MRI

- Accuracy for appendicitis is high, 94-100%
  - NPV 94%
- Can be performed at any stage of pregnancy
  - Unknown effect of gadolinium
  - Does not cross placenta
- Not useful for intestinal imaging

Nuclear medicine

- Majority at <0.5 rad
- Use if fastest/accurate way to establish dx
- Ex. Use of HIDA scan to establish acute chole
- ? For occult GI bleeding
  - rare

CT scan

- Highest risk is for scan of abdomen/pelvis
- Exposure is 2-4 rads
- CT protocols may decrease radiation dose
- Superior diagnostic test for certain scenarios
  - Trauma, pancreatitis, IAA, etc.
- Use weighed against cumulative rad/ex risk

SURGICAL CONSIDERATIONS

The American College of Obstetricians and Gynecologists
Women's Health Care Physicians

COMMITTEE OPINION

- A pregnant woman should never be denied indicated surgery, regardless of trimester
- Elective surgery should be postponed until after delivery
- If possible, nonurgent surgery should be performed in the second trimester when preterm contractions and spontaneous abortion are least likely

Perioperative considerations

- DVT prophylaxis
- Prophylactic antibiotics
- Anesthesia/airway concerns
- Intraoperative monitoring

Risk of preterm labor

- Swedish study, 720K births
  - 0.75% pregnancies complicated by non OB surgery
  - No difference in congenital malform, stillbirth
  - LBW(RR=2) and VLBW(RR=2.2) increased
  - Increased risk of early postpartum death (RR=2.1)
    - Unsure of etiology
- Basis for delay of deferrable surgery
- Risk/benefit of disease process

Role of fetal monitoring

- No consensus on use of intraop monitoring
- Increased risk of unnecessary c-section
- Fetal heart activity before and after
  - Continuous fetal monitoring in near-term

Surgical tenets during pregnancy

- Fetal welfare absolutely depends on mom
  - Diagnostic imaging
  - Decision for surgical intervention
  - Resuscitation/treatment
- "Vulnerable" population
  - More aggressive w/ regard to operating
    - Natural history of disease
  - Wait and see approach may incur undue risk
  - Higher accepted rates of negative exploration
- Mindful of anatomic distortion

Laparoscopy in pregnancy

- Safety is widely accepted in all trimesters
- Beware patient positioning, respiratory
- Best to keep insufflation <15mm Hg
  - Animal studies, effects when >20
  - Capnography to monitor possible acidosis (>32)
- Laparoscopic entry
  - Wide variation, tailor to situation

Cholecystectomy

- Treatment of choice in pregnancy for GB disease regardless of trimester
  - As high as 92% recurrence of sx cholelithiasis
  - 23% complications of AC or GS pancreatitis
- Lap chole improved outcomes compared to laparotomy
  - Decreased SAB and preterm labor

Choledocholithiasis

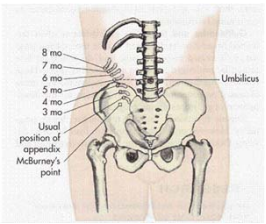
- Consideration of MRCP to confirm diagnosis
- Management should be ~ to nonpregnant
- Options
  - ERCP->lap chole
  - Lap chole->ERCP
  - Intraoperative duct clearance

Appendicitis

- Despite physiologic changes, majority will present with RLQ pain
- Negative appy rate 22-55%
- Up to 25% perforate
- Up to 1/3 of appendix look normal at surgery

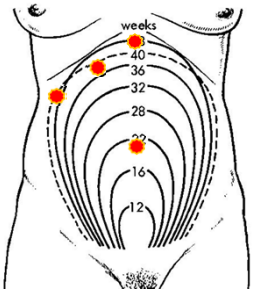
Further technical considerations

- Upward and lateral migration of McBurney point
- ?classic incision vs right mid transverse/RUQ
- Role of preoperative imaging



Port positioning: lap chole

- Limitations traditional positioning
- >20cm



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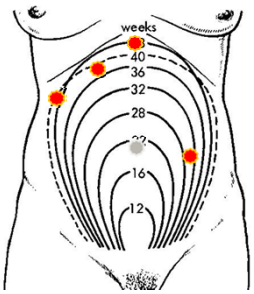

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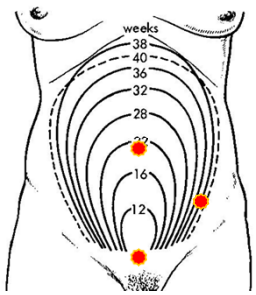

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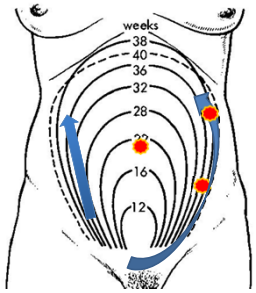

Intestinal obstruction

- Adhesions>volvulus>>hernia, cancer, intuss
- Fetal mortality 26%, maternal mortality 5%
- Minimize delay in diagnosis

Spontaneous visceral rupture

- Splenic rupture most common
- Splenic artery aneurysm
  - 25% of all rupture occur during pregnancy
  - High risk of mortality for mother/fetus
  - >2cm warrants resection

Less common conditions

- Esophageal rupture
- PUD
- IBD
- Cardiac disease
- Breast CA
  - XRT contraindicated
  - Tailored approach to BCT vs MRM