

THE PREGNANT PATIENT AND NON-OBSTETRICAL EMERGENCY SURGERY

In one study of 77 patients' non-obstetrical abdominal surgery is reflected as follows.

- The rate of non obstetric abdominal surgery during pregnancy was 1 in every 527 births.
- Among the 77 patients, the indications for surgery were:
 - Adnexal mass (42%)
 - Acute appendicitis (21%)
 - Gallstone disease (17%)
 - Other (21%).
- There was no maternal or fetal loss or identifiable neonatal birth defect.
- Preterm labor occurred in 26% of the second-trimester patients and 82% of the third trimester patients.
- Preterm labor was most common in patients with appendicitis and after adnexal surgery.
- Preterm delivery occurred in 16% of the patients, but appeared to be directly related to the abdominal surgery in only 5%.
- Despite recent advances in anesthetic, perinatal, and perioperative care, surgical intervention during pregnancy may still result in fetal loss from either:
 - Spontaneous abortion (especially in the first trimester)
 - Premature labor (especially in the third trimester)
 - Additionally, there is an increased risk of low birth weight infants (<2500gm), premature labor and growth-restricted babies

The two most common situations encountered by the general surgeon relating to pregnant women are acute appendicitis and acute cholecystitis.

Acute appendicitis:

- Occurs with the same frequency in gravid and in nongravid females of the same age leading to appendectomy in one out of every 2000 pregnancies
- Suspected appendicitis must be treated as if the patient were not pregnant
- Delay with resultant appendiceal rupture may have dire fetal and maternal consequences

Acute cholecystitis:

- Leads to surgical intervention less frequently (partly due to the availability of effective nonsurgical therapeutic alternatives)
- Cholecystectomy is required in 1-6 out of every 10000 pregnancies
- Despite the effectiveness of nonoperative care, pregnant patients with symptomatic gallstones have a high rate of recurrent symptoms
- Nearly 70% of patients with gallstone pancreatitis will have recurrent biliary pain usually requiring hospitalization
- Fetal loss in patients with gallstone pancreatitis is 10-20%

Potential advantages of laparoscopic appendectomy and cholecystectomy in the pregnant patient:

- Decreased fetal depression due to lessened postoperative narcotic requirements
- Lower risks of wound complications and diminished postoperative maternal hypoventilation

Potential risks:

- Pneumoperitoneum (usually with CO₂)
- Uterine injury during Veress needle and/or trocar placement
- decreased uterine blood flow or premature labor from the increased intra-abdominal pressure
- Increased fetal acidosis or other unknown effects due to CO₂ pneumoperitoneum

Decreased uterine blood flow from pneumoperitoneum

- remains hypothetical.
- It is reasoned that this is unlikely to be a major concern given the frequent pressure alternations induced during maternal Valsalva, coughing, and straining;
- further, it is maintained that pneumoperitoneum may well be safer than manual uterine retraction during open appendectomy or cholecystectomy.
- Hunter et al reported fetal respiratory acidosis during CO₂, but not with N₂O, pneumoperitoneum in a pregnant ewe model.
- Fetal hemodynamic abnormalities (tachycardia and hypertension) were noted and were attributed to fetal hypercarbia; the latter was reversed by maintaining mild maternal respiratory alkalosis. Monitoring maternal arterial blood gasses has proven superior to maternal capnography in this regard.

Recommendations:

- There are no Level I recommendations.
 - There are no randomized prospective trials in pregnant patient for the management of the non-obstetrical acute abdomen or the decision for intra-operative monitoring.
- There are limited Level II recommendations (Prospective and primarily good retrospective studies)
 - OB consultation is indicated for non-obstetrical surgery in the pregnant patient for the coordinated management
 - Laparoscopy in pregnancy for acute abdomen in the setting of appendicitis and cholecystitis is safe in all stages of pregnancy.
 - Ultrasound use is safe for the work-up of the acute abdomen in the pregnant patient.
- There are limited Level III recommendations
 - For the safe use of Helical CT in the evaluation of the acute abdomen in pregnancy.
 - For the safe performance of endoscopy (EGD / colonoscopy) in the pregnant patient in the setting of GI Bleed.

ACOG committee opinion. Non-obstetric surgery in pregnancy. Number 284, August 2003. ACOG Committee on Obstetric Practice.

- There is no data to support specific recommendations regarding non obstetric surgery and anesthesia in pregnancy, it is important for non obstetric physicians to obtain obstetric consultation before performing non obstetric surgery.
- The decision to use fetal monitoring should be individualized, and each case warrants a team approach for optimal safety of the woman and her baby.
- Obtain OB consultation on all pregnant patients.

Timing of Surgery in the Pregnant Patient:

- Surgery during the first or second trimester is not associated with significant preterm labor, fetal loss or risk of teratogenicity. Surgery during the third trimester is associated with preterm labor, but not fetal loss.
- Intra-abdominal surgery during pregnancy carries an acceptable risk to the mother and fetus; complications are related to disease severity and operative delay rather than to the operative procedure itself.

Work-up of the Acute Abdomen

- The accepted cumulative dose of ionizing radiation during pregnancy is 5 rad (cGy)
 - no single diagnostic study exceeds this maximum.
 - the amount of exposure to the fetus from a two-view chest x-ray of the mother is only 0.00007 rad (cGy)
 - The most sensitive time period for central nervous system teratogenesis is between 10 and 17 weeks of gestation.
 - Non-urgent radiologic testing should be avoided during this time.
 - Rare consequences of prenatal radiation exposure include a slight increase in the incidence of childhood leukemia
 - possibly a very small change in the frequency of genetic mutations.
 - Such exposure is not an indication for pregnancy termination.
 - Appropriate counseling of patients before radiologic studies are performed is critical.
- Helical computed tomography appears to be a useful, noninvasive test to accurately diagnose acute appendicitis in pregnancy

Intra-Operative Fetal Monitoring:

- Prior to 9 weeks of gestation, no pre, intra, or postoperative techniques for fetal evaluation will be performed.
- From 9 weeks of gestation to approximately 24 weeks of gestation, preoperative fetal heart rate checks by Doppler, ultrasound, or other techniques may be utilized to assess fetal heart rate and possibly uterine contractions.
 - These will typically be performed by an O.B. resident or labor and delivery nurse in consultation with Obstetrics and Labor and Delivery, with appropriate notation made in the patient's chart or electronic medical record.
- From 18 weeks to 24 weeks gestation, intraoperative fetal monitoring may be obtained by consultation between the attending anesthesiologist and the obstetrical attending after considering the above factors.

- Alternatively, pre and postoperative checks for uterine contraction, by an O.B. resident or nurse uterine palpation, and fetal heart rate checks by Doppler should be recorded in the patient's chart or electronic medical record.
- Starting at 24 weeks gestation, intraoperative monitoring is indicated when it is feasible to do so as judged by the nature of the procedure and the physicians in attendance.
 - Intraoperative monitoring is to be arranged via the Labor and Delivery suite, preferably with as much advance notification as possible.

Laparoscopy in the Pregnant Patient

- Laparoscopy in pregnancy should be performed with utmost care.
 - In the second trimester of pregnancy, open laparoscopic approach is strongly recommended.
 - Laparoscopic management of appendicitis and symptomatic cholelithiasis during pregnancy can be performed with minimal fetal and maternal morbidity when accepted management guidelines are followed.
- Acute Appendicitis:
 - Diagnosis of acute appendicitis is difficult in pregnancy.
 - Delay in diagnosis and surgery results in increase in complications.
 - Emergency surgical intervention should be performed when acute appendicitis is suspected during pregnancy.
 - Laparoscopic appendectomy can be safely performed during pregnancy.
 - One limitation may be the size of the gravid uterus, which interferes with adequate visualization and instrumentation in the third trimester of pregnancy.
- Acute Cholecystitis:
 - LC is a feasible and safe method for treating severely symptomatic patients.
 - The successful outcome in all trimesters suggests that LC is a safe procedure throughout pregnancy; however, surgery in the second trimester is preferable.
 - Compared with OC, there is a decreased risk of spontaneous abortion in the first trimester and preterm labor in the third trimester.
 - In one study, laparoscopic cholecystectomies were performed as late as 34 weeks estimated gestational age without any adverse effects on pregnancy outcome.
 - Recommendations are prompt laparoscopic cholecystectomy in pregnant women with symptomatic biliary disease because it is safe and it reduces hospital admissions and frequency of premature labor.
 - The combination of ERCP and laparoscopic cholecystectomy offers a safe and effective option for the definitive treatment of complicated gallstone disease and intractable pain during pregnancy, and there is sufficient access for the combined treatment to be employed

SAGES (Society of American Gastrointestinal and Endoscopic Surgeons) GUIDELINES FOR LAPAROSCOPIC SURGERY DURING PREGNANCY (Oct. 2000)

Recommendations:

- Obstetrical consultation should be obtained preoperatively.
- When possible, operative intervention should be deferred until the second trimester, when fetal risk is lowest.
- Pneumoperitoneum enhances lower extremity venous stasis already present in the gravid patient and pregnancy induces a hypercoagulable state. Therefore pneumatic compression devices should be utilized whenever possible.
- Fetal and uterine status, as well as maternal end tidal CO₂ and/or arterial blood gases, should be monitored.
- The uterus should be protected with a lead shield if intraoperative cholangiography is a possibility. Fluoroscopy should be utilized selectively.
- Given the enlarged gravid uterus, abdominal access should be attained using an open technique.
- Dependent positioning should be utilized to shift the uterus off of the inferior vena cava.
- Pneumoperitoneum pressures should be minimized (to 8 - 12 mm Hg) and not allowed to exceed 15 mmHg.

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