

# Emergency General Surgery

## The Pregnant Patient and Non-Obstetrical Emergency Surgery

Revised: February 6, 2004

### The Problem:

In one study of 77 patients' non-obstretical 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%) and 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) or 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 with surgical intervention during pregnancy. Therefore, when ever possible, surgery should be deferred until after parturition. Unfortunately, urgent surgical intervention in the gravid patient is occasionally necessary. The two most common situations encountered by the general surgeon 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. In this setting, suspected appendicitis must be treated as if the patient were not pregnant. Thus, the suspicion of appendicitis usually merits operative exploration. Indeed, 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 non-operative 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%.

Currently, in nonpregnant patients, appendectomy and cholecystectomy are frequently performed laparoscopically. While pregnancy has been considered a relative contraindication to laparoscopy, recent reports have refocused attention on this issue.

Potential advantages of laparoscopic appendectomy and cholecystectomy in the pregnant patient include decreased fetal depression due to lessened postoperative

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narcotic requirements, lower risks of wound complications and diminished postoperative maternal hypoventilation. Additional benefits may include more rapid maternal recovery. However, the additional requirement of pneumoperitoneum (usually with CO<sub>2</sub>) has raised concern about fetal risks. These risks have been postulated to include uterine injury during Veress needle and/or trocar placement decreased uterine blood flow or premature labor from the increased intra-abdominal pressure, and increased fetal acidosis or other unknown effects due to CO<sub>2</sub> 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 CO<sub>2</sub>, but not with N<sub>2</sub>O, 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.

Most case reports and small series indicate that laparoscopy can be safely performed during pregnancy. One report suggests otherwise. Two recent studies suggest there is no difference in fetal outcome for patients with singleton pregnancies undergoing laparoscopy or laparotomy. Despite the growing clinical experience suggesting laparoscopy is as safe as laparotomy in pregnancy, long-term clinical studies are lacking. For this reason caution must be exercised.

### **I. Recommendations:**

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

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### **II. OB Consultation:**

1. **ACOG committee opinion. Non-obstetric surgery in pregnancy. Number 284, August 2003. ACOG Committee on Obstetric Practice.**
  - a. 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.
  - b. 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.
2. Obtain OB consultation on all pregnant patients.

### **III. Timing of Surgery In the Pregnant Patient:**

1. 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.
2. Intraabdominal 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.

### **IV. Work-up of the Acute Abdomen**

1. The accepted cumulative dose of ionizing radiation during pregnancy is 5 rad, and no single diagnostic study exceeds this maximum. For example, the amount of exposure to the fetus from a two-view chest x-ray of the mother is only 0.00007 rad. The most sensitive time period for central nervous system teratogenesis is between 10 and 17 weeks of gestation.
2. 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 and, 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.
3. Helical computed tomography appears to be a useful, noninvasive test to accurately diagnose acute appendicitis in pregnancy

### **V. Intra-Operative Fetal Monitoring:**

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The following guidelines are established regarding the use of fetal monitoring for pregnant patients undergoing surgery at the Vanderbilt University Medical Center:

Gestational age, maternal and gestational history, nature of surgery, urgency of surgery are to be considered in making a determination as to which, if any techniques of preoperative, intraoperative or postoperative fetal monitoring or evaluation are appropriate. This decision is to be made via consultation of the anesthesiologist assigned to the case, the patient's obstetrician (or a Vanderbilt obstetrician on call), and possibly the surgeon of record.

- 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.

#### **VI. Endoscopy in the Pregnant Patient.**

1. In one retrospective study, EGD did not induce labor or result in congenital malformations. EGD is not contraindicated during pregnancy. EGD is beneficial in pregnant patients with upper GI bleeding.
2. In one retrospective multicenter study, findings of flexible sigmoidoscopy did not induce labor or result in congenital malformations, that sigmoidoscopy is not contraindicated during pregnancy, and that sigmoidoscopy should be considered in medically stable pregnant patients with significant gastrointestinal bleeding.
3. In one retrospective study of 20 pregnancies, panendoscopy did not induce labor or result in congenital malformations. Panendoscopy is not absolutely contraindicated during pregnancy. Panendoscopy appears to be beneficial in medically stable pregnant patients with significant gastrointestinal bleeding. Panendoscopy should be performed with monitoring by electrocardiography and pulse oximetry after stabilization of vital signs, which may require transfusion of blood products and supplemental oxygen administration.

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### VII. Laparoscopy in the Pregnant Patient

1. Laparoscopy in pregnancy should be performed with utmost care.
  - a. 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.
2. Acute Appendicitis: Diagnosis of acute appendicitis is difficult in pregnancy. Delay in diagnosis and surgery results in increase in complications.
  - a. 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.
3. 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.
  - a. Recommends 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.
  - b. 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

#### 4. SAGES GUIDELINES FOR LAPAROSCOPIC SURGERY DURING PREGNANCY (Oct. 2000)

Recommendations:

1. Obstetrical consultation should be obtained preoperatively.
2. When possible, operative intervention should be deferred until the second trimester, when fetal risk is lowest.
3. 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.
4. Fetal and uterine status, as well as maternal end tidal CO<sub>2</sub> and/or arterial blood gases, should be monitored.

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5. The uterus should be protected with a lead shield if intraoperative cholangiography is a possibility. Fluoroscopy should be utilized selectively.
6. Given the enlarged gravid uterus, abdominal access should be attained using an open technique.
7. Dependent positioning should be utilized to shift the uterus off of the inferior vena cava.
8. Pneumoperitoneum pressures should be minimized (to 8 - 12 mm Hg) and not allowed to exceed 15 mmHg.

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