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Surgical Endoscopy
Ultrasound and
Interventional Techniques

Guidelines for laparoscopic surgery during pregnancy

Despite recent advances in anesthetic, perinatal, and perioperative care, surgical intervention during pregnancy still results in fetal loss from either spontaneous abortion (especially in the first trimester) or premature labor (especially in the third trimester). Unfortunately, urgent surgical intervention in the gravid patient is occasionally necessary. The two most common situations encountered by the general surgeon are acute appendicitis or 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 2,000 pregnancies [4]. 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 one to six out of every 10,000 pregnancies [8].

Currently, in nonpregnant patients, both appendectomy and cholecystectomy are frequently performed laparoscopically. However, pregnancy has been considered a relative contraindication to laparoscopy. Recent reports [1, 2, 5, 6, 11–21] 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 narcotic requirements [6, 15, 20, 21], lower risks of wound complications [2, 5, 15], and diminished postoperative maternal hypoventilation [15, 20]. However, the additional requirement of pneumoperitoneum (usually with CO_2) has raised concern about fetal risks. These risks have been postulated to include uterine injury during trocar placement [2, 5, 6, 11, 12, 14, 15, 17, 21], decreased uterine blood flow [2, 5, 14, 21], or premature labor [5, 6, 17] from the increased intra-abdominal pressure, and increased fetal acidosis [5, 14, 17] or other unknown effects [11] due to CO_2 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 [17]; further, it is maintained that pneumoperitoneum may well be safer than manual uterine retraction during open appendectomy or cholecystectomy [21].

Hunter et al. [9] reported fetal respiratory acidosis during CO_2, but not N_2O, 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 [9]. Monitoring maternal arterial blood gasses proved superior to maternal capnography in this regard [6].

While some anecdotal case reports [2, 5, 6, 11–21] indicate that laparoscopy can be safely performed during pregnancy, one recent report [1] suggests otherwise. Limited experience as well as the limited laboratory data [19] suggest caution. Certain maneuvers must be routinely adopted in order to enhance operative safety. These include:

1. When possible, operative intervention should be deferred until the *second trimester,* when fetal risk is lowest [7].
2. Since pneumoperitoneum enhances lower-extremity venous stasis [3, 22] already present in the gravid patient, and since pregnancy induces a hypercoagulable state [12, 20] *pneumatic compression devices* must be utilized.
3. *Fetal and uterine status,* as well as *maternal end-tidal CO_2* and *arterial blood gases,* should be monitored.
4. The uterus should be protected with a *lead shield* if intraoperative cholangiography is a possibility. Fluoroscopy should be utilized selectively.
5. Given the enlarged gravid uterus, abdominal access should be attained using an *open technique.*
6. *Dependent positioning* should be utilized to shift the uterus off of the inferior vena cava.
7. *Pneumoperitoneum pressures should be minimized* (to 8–12 mmHg) and not allowed to exceed 15 mmHg.
8. *Obstetrical consultation* should be obtained preoperatively.

SAGES encourages future studies into methods which increase the safety of laparoscopy in the pregnant patient (e.g., alternative gases or abdominal lift devices [10]).

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