

Nov. 97

# Laparoscopic Management of Pelvic Pathology During Pregnancy

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## Abstract

*Advanced operative laparoscopy is being performed increasingly for various indications and in diverse patient populations, including gravid women. In the United States approximately 1.6% to 2.2% of pregnant women require nonobstetric surgery for abdominal and pelvic pathology. Increasing numbers of case reports suggest the feasibility and safety of operative laparoscopy during pregnancy. We identified certain management issues specific to these procedures based on our experience with nine cases of operative laparoscopy in women with gestations up to 22 weeks.*

*(J Am Assoc Gynecol Laparosc 4(5):605-608, 1997)*

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Nonobstetric surgery is performed in 1.6% to 2.2% of pregnant women.<sup>1</sup> These procedures in gravid patients with abdominal and pelvic pathology pose a particular challenge to the clinician. Physicians often delay surgical intervention until absolutely necessary out of concern over potential detrimental effects on the pregnancy. Furthermore, physiologic alterations of pregnancy in respiratory, cardiovascular, renal, gastrointestinal, and hematologic systems decrease the reserve for surgical stress and increase the potential for certain risks such as thromboembolism.<sup>2</sup>

Operative laparoscopy is performed increasingly for various indications. Some advantages are better

exposure with a magnified and improved view, decreased postoperative incisional pain and thus reduced requirement for analgesic agents, rapid postoperative return of bowel function, and low morbidity from atelectasis and thromboembolic events.<sup>3</sup> Pregnant women and their fetuses may especially benefit from the rapid recovery that the laparoscopic approach provides.

According to a review of available case reports, operative laparoscopy during pregnancy should be feasible and safe.<sup>4</sup> However, no controlled or randomized studies have assessed its efficacy and safety compared with laparotomy. Based on our experience

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Presented in part at the 25th annual meeting of the American Association of Gynecologic Laparoscopists, Chicago, Illinois, September 24-29, 1996.

with nine cases of operative laparoscopy in gravid women up to 22 weeks' gestation, we identified management issues surrounding this approach.

### *Literature Review of Management Issues*

Risks and concerns specific to laparoscopy in pregnant women include inadvertent uterine injuries from cannula placement, and possible effects of carbon dioxide (CO<sub>2</sub>) pneumoperitoneum on maternal hemodynamics and relative hypercarbia leading to fetal acidosis.

Two reports described Veress needle insufflation of the intrauterine cavity resulting in CO<sub>2</sub> embolism.<sup>5,6</sup> The risk of uterine injury is greatest at the time of primary cannula placement in the enlarging uterus. As done in patients with significantly large pelvic masses that occupy the subumbilical space, our experience has been to modify the primary cannula insertion site to supraumbilical, subxiphoid, or left upper quadrant area well above the palpable uterine fundus. For upper abdominal laparoscopic surgery, such as cholecystectomy, few case reports describe good outcome in women up to 31 weeks' gestation.<sup>7</sup>

Concern exists regarding the effect of CO<sub>2</sub> pneumoperitoneum on the fetus. Limited studies of pneumoperitoneum induced in pregnant sheep reported increased fetal arterial blood pressure, tachycardia, and respiratory acidosis, which were corrected only partly with alterations in ventilator settings based on maternal capnography results.<sup>8,9</sup> Of interest, fetal respiratory acidosis did not occur when pneumoperitoneum was established with nitrous oxide (N<sub>2</sub>O). However, administration of N<sub>2</sub>O as a general anesthetic to pregnant women is controversial due to its known ability to irreversibly inactivate vitamin B<sub>12</sub>, which may have detrimental effects on fetal development.<sup>10</sup> These issues underscore the importance of further studies to determine the safety of different pneumoperitoneum gases during pregnancy.

Despite these concerns, the number of successful operative laparoscopies in gravid patients is increasing.

### *Case Reports*

We retrospectively reviewed nine cases of pregnant women (age 23–40 yrs, median 30 yrs; gestational age 12–22 wks, median 14 wks) who underwent operative laparoscopy for pelvic pathology between April

1990 and November 1995 (Table 1). Operative notes, hospital discharge summaries, follow-up data from office visit notes, inquiry with primary referring physicians, and telephone interviews to patients were gathered and reviewed. Seven women underwent ovarian cystectomy for persistent adnexal mass of significant size or complexity by ultrasound evaluation. Two required emergency surgery for acute abdominal pain, one for abdominal hemorrhage and one for torsed paratubal cyst.

Patients were counseled preoperatively regarding lack of experience with laparoscopy during pregnancy and possible conversion to laparotomy if necessary. Risks of spontaneous abortion and premature labor were cited as possible complications, in addition to the usual risks associated with laparoscopic surgery. All patients gave informed consent and underwent the procedure under general endotracheal anesthesia. End-tidal CO<sub>2</sub> pressure and transcutaneous oxygen saturation were monitored continuously and no significant changes were noted.

### *Operative Procedure*

Patients were placed in dorsolithotomy position with Allen stirrups, and the table was slightly levorotated in woman with pregnancies beyond the first trimester to maximize uterine blood flow.<sup>3</sup> No uterine or cervical manipulator was used. The primary cannula site was determined individually according to the level of the uterine fundus as determined by abdominal palpation. Veress needle (3 patients) or direct cannula placement (5) was performed as described elsewhere.<sup>3</sup> In one woman of 22 weeks' gestation, the primary cannula was placed through a stab wound in the subxiphoid area 2 to 4 cm above the umbilicus. Insufflation of CO<sub>2</sub> was maintained at 12 to 15 mm Hg in seven patients and 10 mm Hg in two. Three or two 5-mm ancillary cannulas were placed under direct vision in the lower abdomen and a suction irrigator, grasper, and bipolar forceps were positioned through these ports.

A CO<sub>2</sub> laser (UltraPulse 5000L; Coherent, Palo Alto, CA) was applied through the operative channel of the laparoscope.<sup>3</sup> Once the adnexal mass was determined to have a nonmalignant appearance, laparoscopic ovarian cystectomy was performed as described elsewhere.<sup>3</sup>

Postoperatively, fetal heart tone was auscultated with a portable Doppler machine in the recovery room and before patients were discharged. A cervical

Table 1. Summary of Operative Laparoscopies Performed in Gravid Women

EGA at Diagnosis (wks)	EGA at Surgery (wks)	Symptoms	Pathology	Procedure Performed	Operating Time (min)	Outcome
6	15	None	Hemorrhagic cyst with deciduosis 6 and 9 cm	Bilateral ovarian cystectomy	130	No complication, term AGA
0	16	None	Mature cystic teratoma 5 cm	Ovarian cystectomy	87	No complication, term AGA
7	14	None	Endometrioma 7 cm	Ovarian cystectomy	55	No complication, term AGA
13	13	Acute abdomen	Hemoperitoneum, spontaneous laceration of adhesion	Evacuation of pelvic hematoma	120	PROM 31 wks emergency cesarean delivery, AGA
10	13	None	Simple serous cyst 11 cm	Ovarian cystectomy	65	No complication, term AGA
14	14	None	Corpus luteum cyst 6 cm	Ovarian cystectomy	80	No complication, term AGA
20	22	Pelvic pain	Torsed paratubal cyst	Paratubal cyst removal	120	No complication, term AGA
10	12	None	Mature cystic teratoma 4 cm	Ovarian cystectomy	150	No complication, term AGA
8	16	None	Mature cystic teratoma 7 cm	Ovarian cystectomy	125	No complication, term AGA

EGA = estimated gestational age; AGA = appropriate for gestational age; PROM = premature rupture of membranes.

examination was performed to rule out occult uterine contractions.

Operating time ranged from 55 to 150 minutes (median 120 min). No procedure was converted to laparotomy. End-tidal CO<sub>2</sub> pressures remained below 40 mm Hg. None of the patients received tocolytics perioperatively and none reported premature uterine contractions. No cervical changes were noted, and fetal heart rates were normal postoperatively. Hospital stay ranged from 4.5 to 96 hours (median 24 hrs), with seven of nine women discharged within 24 hours. All patients were fully ambulatory with return of bowel function within 24 hours.

### Pregnancy Results

Eight women delivered term infants of appropriate size for gestational age. The one woman with intraabdominal hemorrhage had spontaneous rupture of membranes at 31 weeks, 18 weeks after surgery, and delivered by cesarean section a viable neonate of appropriate size for gestational age. On direct interviews with the mothers, all children were reported

healthy, with normal mental, physical, and emotional characteristics for their age.

### Summary

We performed nine operative laparoscopies with good outcomes. Two of these patients had gestations of 16 and 22 weeks, the most advanced reported in the literature to our best knowledge. The known advantages of this approach may be beneficial to pregnant women and their fetuses. Concerns remain, however, regarding its safety, and we propose that prospective, controlled, randomized studies be conducted to assess the efficacy, safety, and advantages of operative pelvic laparoscopy over laparotomy in gravid women.

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