Operative Laparoscopy in Pregnancy

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ABSTRACT

Objective: We compared the surgical outcomes of pregnant women undergoing laparotomy in the first 2 trimesters of pregnancy with those undergoing laparoscopy for the management of acute pelvic pain.

Methods: We performed a systematic retrospective chart review of patients whose discharge diagnosis included intrauterine pregnancy with exploratory laparotomy or laparoscopy from August 1, 1993 to October 31, 1999. The following factors were assessed: preoperative diagnosis, postoperative diagnosis, gestational age at the time of surgery, operative time, hospital stay, pathology, gestational age at delivery, complications, and outcome of the pregnancy in both groups.

Results: Sixteen pregnant patients underwent surgery during the study period. All but one had abdominopelvic pain, and all patients had an associated adnexal mass. The mean gestation age at the time of surgery was 15±6 weeks versus 13±4 weeks in the laparoscopic and laparotomy groups, respectively (P=NS). All patients undergoing laparoscopy remained in the hospital for one day compared with a mean of 4.4±1.1 days in the laparotomy group (P<0.0001). Pregnancy outcomes were similar and uniformly good.

Conclusion: Laparotomy can be avoided and pregnant patients managed safely by operative laparoscopy, with shorter hospital stays.

Key Words: Laparoscopy, Pregnancy, Laparotomy, Pain, Adnexal mass.

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INTRODUCTION

The incidence of pelvic pain requiring surgery ranges from approximately 1:440 to 1:1300.[1] The incidence of surgery during pregnancies is approximately 0.75%.[2] One in 600 pregnancies are complicated by the presence of adnexal masses.[3] One must consider operative intervention when the mass persists or the patient develops symptoms of acute pelvic pain. The majority of these cases are still approached via laparotomy due to a concern about injuring the pregnancy with laparoscopic trocar insertion or the high intraperitoneal pressures associated with pneumoperitoneum. Several studies have documented the safety of laparoscopic cholecystectomy during pregnancy.[4-8] Conversely, 2 reports reveal that complications may occur while laparoscopy is being performed during pregnancy.[6,9] A growing body of evidence indicates that laparoscopy for gynecologic indications can be performed safely during pregnancy.[8,10-15] We compare the management of pregnant patients with symptomatic abdominal pain managed by performing laparoscopic surgery with those managed by laparotomy.

METHODS

We performed a retrospective chart review of all intrauterine pregnancies managed by laparotomy or laparoscopy between August 1, 1993 and October 31, 1998. The following factors were noted: patient age, gestational age, presenting symptoms, ultrasound findings, operative time, procedure performed, pathology results, gestational age at delivery, pregnancy outcome, hospital length of stay, and complications.

All patients undergoing laparoscopy were positioned in the dorsal supine position with anesthesia in control of a leftward tilt. Positional changes were modified with close communication with the anesthesia personnel. General endotracheal anesthesia was used in all patients. Sequential compression devices were placed below the knees. The individual placement of the laparoscope and operating trocars was modified depending on uterine size and gestational age. The trocar sizes were also modified according to gestational age. Our rule was to use the open technique for all initial trocar placements. If the uterus was 18 to 20 weeks gestational or greater, the ini-

tial trocar placement was above the umbilicus, using a 5-mm trocar via the open technique. The remaining trocar sites were placed under direct visualization varying from 5 mm to 12 mm on the affected side. Versa Step trocars were used in some cases per surgeons' discretion. In no cases were more than 4 trocar sites used, including the laparoscope. If the uterus was less than 18 weeks, the initial trocar placement was in the umbilicus, not subumbilical. CO_2 pneumoperitoneum was obtained with open placement of the laparoscopic trocar that ranged from a 10-mm to a 3-mm diagnostic laparoscope. In pregnancies associated with a uterine size of 18 weeks or greater, the initial trocar placement was above the navel, with the lateral ports being placed under direct visualization. Intraabdominal pressure was monitored in all patients, and care was taken not to exceed 12 mm Hg pressure to ensure adequate venous return and minimize pressure on the inferior vena cava.[8,13,15,16] Using multiple graspers and manipulators, the abdominal contents were manipulated based on the location, symptoms, and characteristics of the pelvic pathology. Ovarian cystectomy, oophorectomy/salpingectomy, or lysis of adhesions was performed. In all cases, uterine manipulation was kept to a minimum. Copious irrigation was used. Postoperatively, the patients were observed closely during labor and delivery for increased uterine activity. We used indomethacin in a 1-time dose of 50 mg per rectum at greater than 12 week's gestation. No further tocolysis was used. All patients undergoing laparotomy were placed in the supine position with a slight leftward tilt. General endotracheal anesthesia was used in all cases. The patients underwent midline abdominal incisions in all cases with minimal manipulation of the uterus. Preoperatively, the fetus was monitored. Postoperatively, patients were observed closely during labor and delivery for increased uterine activity and fetal heart tones.

Discreet data were compared with the chi-square test, with Fisher's exact test used where appropriate. The independent samples t test was used to analyze continuous variables.

RESULTS

The perioperative characteristics of the study patients are presented in **Table 1**. Pelvic/abdominal pain was present in all but one patient (6 of 7 laparoscopically managed patients and 9 of 9 patients undergoing laparotomy). All patients had a preoperative finding of an adnexal mass. The pathology noted at the time of surgery is presented

in **Table 2**. The pregnancy outcomes are noted in **Table 3**. One of 7 infants was delivered prematurely (34 weeks vaginally) in the laparoscopically managed group compared with 3 of 9 (31 weeks for breech, 33 weeks for failed induction for chorioamnionitis, 35.57 weeks for severe preeclampsia) managed by laparotomy. This difference was not statistically significant. All deliveries were remote from the index operation except for the one spontaneous abortion following a patient managed by laparotomy. All infants born preterm did well. The blood loss for the laparoscopies was noted to be minimal. The blood loss for the laparotomies ranged from a low of 50 cc to a high of 300 cc, with the mean of 117±75 cc. The mean operating time for the laparoscopies was 116.7 minutes, with a mean operating time for the laparotomies of 88 minutes (not statistically significant).

DISCUSSION

Our study supports the previously observed safety and effectiveness of operative laparoscopy during pregnancy. Until recently, laparoscopy was considered contraindicated in pregnancy. Our data show no increased morbidity associated with laparoscopy performed during pregnancy. In a landmark survey by Reedy et al,[9] 413 laparoscopic procedures performed during pregnancy for general surgical and gynecological indications appeared to have no higher fetal or maternal complications compared with those in a population undergoing laparotomy, and none were associated with the laparoscopic procedure itself.[10] Nongynecologic laparoscopic procedures have been reported far more than gynecologic procedures have, with cholecystectomy being the most commonly reported. Reedy et al[12] compared laparoscopy and laparotomy in pregnancy using the Swedish Health Registry, comparing a number of parameters including birth weight, gestational length, growth restriction, infant survival, and malformations, concluding that no differences existed in the parameters when comparing laparoscopy and laparotomy. A fetal loss of 10% to 25% and a preterm delivery rate of approximately 20%[12-14] have been reported, but these data are associated with laparotomy.

Adherence to several technical aspects is important when performing laparoscopy during pregnancy. Clearly, safe laparoscopic access is paramount, and we feel that the open (Hasson) technique is appropriate. Modification of trocar sites must be individualized but must be anticipated once access is initially obtained to ensure an effective

Table 1.
Patient Characteristics and Perioperative Variables

Variable	Laparoscopy (n=7)	Laparotomy (n=9)	*P*
Age (years)*	27.1±3.7	22.9±5.3	0.478
Nulliparous	1(14%)	5(56%)	0.145
Gestational age at surgery (weeks)*	15±6	13±4	0.232
Operating time (minutes)*	116±34	89±35	0.809
Hospital stay (days)*	1.0±0.0	4.4±1.1	<0.0001

*Mean ± SD.

Table 2.
Pathological Diagnoses

Diagnosis	Laparoscopy (n=7)	Laparotomy (n=9)
Serous cystadenoma	2	0
Benign cystic teratoma	1	3
Simple ovarian cyst	2	2
Peritubular cyst	1	0
Luteoma	0	1
Endometrioma	0	1
Leiomyomata	0	2
Adhesions	1	0

Table 3.
Pregnancy Outcomes*

Outcome	Laparoscopy (n=9)	Laparotomy (n = 9)
Spontaneous abortion	0	1
Preterm delivery	1	3
Term delivery	6	5

*Differences not statistically significant.

procedure with minimal, if any, uterine manipulation; the location of these trocars in relation to the enlarged uterus is a key to success. Smaller trocars, diameters down to 2 mm, were used. In addition, 3-mm laparoscopes superior to the umbilicus were used in our study (on uteri that were at or above the umbilicus). Minimizing CO_2 insufflation to maximize both cardiac output, maternal hepatic flow, and minimizing fetal acidosis is best accomplished by keeping intraperitoneal pressures ≤12 mm Hg.[13,15] Communication with the anesthesiologist for patient's O_2 and CO_2 status should be routine. To minimize risk of venous stasis, we used sequential compression devices below the knees and kept the patient out of the pure supine position with use of the operating room table. Foley catheters were routinely used after general anesthesia was obtained to decompress the bladder to prevent compromise of the operative field.[15,16]

CONCLUSION

Laparoscopic surgery associated with pregnancy is feasible and carries a low morbidity. Although their operative times were longer, the pregnant women undergoing operative laparoscopy appear to have benefited from the minimally invasive procedures with brief hospital stays, rapid postoperative recoveries, and subsequent successful pregnancy outcomes.

References:

1. Kort B, Katz VI, Watson WJ. Effect of non-obstetric operation during pregnancy. *Surg Gynecol Obstet*. 1993;177:371- 376.

2. Mazze RI, Kallen B. Reproductive outcome after anesthesia and operation during pregnancy: a registry study of 5,405 cases. *Am J Obstet Gynecol*. 1989;161:1178-1185.

3. Kohler MF. The adnexal mass in pregnancy. *Postgrad Obstet Gynecol*. 1994;14:1-5.

4. Graham G, Baxi L, Tharakan T. Laparoscopic cholecystectomy during pregnancy - A case series and review of the literature. *Obstet Gynecol Surv*. 1998;53:566-574.

5. Amos JD, Schorr SJ, Norman PF, et al. Laparoscopic surgery during pregnancy. *Am J Surg*. 1996;171:435-437.

6. Eichenberg BJ, Vanderlinden J, Miguel C, et al. Laparoscopic cholecystectomy in the third trimester of pregnancy. *Am Surg*. 1996;62:874-877.

7. Lanzafame RJ. Laparoscopic cholecystectomy during pregnancy. *Surgery*. 1995;118:627-633.

8. Gurbuz AT, Peetz ME. The acute abdomen in the pregnant patient- Is there a role for laparoscopy? *Surg Endosc*. 1997;11:98-102.

9. Reedy M, Kim U, Thompson E, Rayburn WL. Laparoscopy during pregnancy. a safe alternative to laparoscopy? *Contemp Ob Gyn*. April 15, 1998:75-91.

10. Hunter JG, Swanstrom L, Thornberg K. Carbon dioxide pneumoperitoneum induces fetal acidosis in a pregnant ewe model. *Surg Endosc*. 1995;9:272-279.

11. Reedy MB, Galan HL, Richards WE, Preece CK, Wetter PA, Kuehl TJ. Laparoscopy during pregnancy. A survey of laparoendoscopic surgeons. *J Reprod Med*. 1997;42:33-38.

12. Reedy MB, Kallen B, Kuehl TJ. Laparoscopy during pregnancy: a study of five fetal outcome parameters with use of the Swedish Health Registry. *Am J Obstet Gynecol*. 1997;177:673-680.

13. Duncan PG, Pope WDB, Cohen MM, et al. Fetal risk of anesthesia and surgery during pregnancy. *Anesthesiology*. 1986;64: 790-794.

14. Mazze RI, Kallen B. Appendectomy during pregnancy—a Swedish Registry study of 778 cases. *Obstet Gynecol*. 1991;77: 835-840.

15. Carter J, Chang E, Haynes G, Scardo J. Hemodynamic effects of pneumoperitoneum during gynecologic laparoscopic surgery. *J Gynecol Surg*. 1997;13:169-173.

16. Iafrati MD, Yarnell R, Schwaitzberg SD. Gasless laparoscopic cholecystectomy in pregnancy. *J Laparoendosc Surg*. 1995;5:127-130.