

Non-Gynecologic Laparoscopy in Second and Third Trimester Pregnancy: Obstetric Implications

John P. Geisler, MD, Stephen L. Rose, MD, Christopher S. Mernitz, MD,
Janice L. Warner, RN, A. Kinney Hiett, MD, RDMS

ABSTRACT

Purpose: To review the effect of non-gynecologic laparoscopic procedures performed during the second and third trimesters of pregnancy on pregnancy outcome.

Materials and Methods: A review of the patient log for the antenatal obstetrical unit was used to identify the patients in this series from January 1, 1997 to December 31, 1997. Medical records were then analyzed to identify estimated gestational age at surgery and delivery, type of delivery, use of tocolysis, and complications from surgery.

Results: Nine patients were identified as having non-gynecologic laparoscopic surgery (without conversion to laparotomy) during the second or third trimester of pregnancy. The median estimated gestational age at surgery was 25 weeks (mean 24 weeks). The most common procedure performed was laparoscopic cholecystectomy (6 patients). Five patients received tocolysis after the initial procedure. All patients delivered at greater than or equal to 37 weeks estimated gestational age (median 38 weeks). No infants were admitted to the neonatal intensive care unit.

Conclusions: Laparoscopic procedures appear safe in second and third trimester pregnancy. In this study, laparoscopic cholecystectomies were performed as late as 34 weeks estimated gestational age without any adverse effects on pregnancy outcome.

Key Words: Laparoscopy, Pregnancy, Non-gynecologic laparoscopy.

INTRODUCTION

Approximately 1-2% of pregnancies are complicated by the need for abdominal or pelvic surgery during pregnancy.¹ Abdominal-pelvic problems requiring intervention can vary from acute cholecystitis and appendicitis to the discovery of an adnexal mass during pregnancy.²⁻⁴ Recently, operative laparoscopy has been shown to be a possible alternative to traditional laparotomy.⁵⁻⁷ In non-pregnant patients, laparoscopic surgery has been associated with shorter hospitalization, decreased pain, and quicker return to regular activity.⁶ These same endpoints have just begun to be analyzed in pregnancy.⁶ As of yet, no manuscript has focused on the effect of second or third trimester non-gynecologic laparoscopic surgery on the estimated gestational age at delivery or rate of neonatal care unit admissions. A survey of members of the Society of Laparoendoscopic Surgeons revealed one case of premature labor following a laparoscopic appendectomy while analyzing immediate postoperative complications.⁷ Therefore, the purpose of this article was to review the effect of laparoscopic procedures performed during the second and third trimesters of pregnancy on pregnancy outcome.

MATERIALS AND METHODS

The patient log from the antenatal unit at St. Vincent Hospital from January 1, 1997 to December 31, 1997 was examined. All patients of at least 13 weeks estimated gestational age (EGA) undergoing non-gynecologic laparoscopic surgery were extracted. Hospital records were then analyzed to determine EGA at time of surgery, procedure performed, complications of surgery, use and type of tocolysis, EGA at delivery, and neonatal intensive care unit admission.

RESULTS

Nine patients in their second or third trimester of pregnancy underwent non-gynecologic laparoscopy during 1997 (**Table 1**). No laparoscopies were converted to laparotomies. Also, during the study's observation period, no open cholecystectomies and only one open appendectomy were performed. The most common procedure

Department of Obstetrics and Gynecology
St. Vincent Hospitals and Health Services
Indianapolis, Indiana

Address reprint request to: John P. Geisler, MD, 8424 Naab Road, Suite 2M,
Indianapolis, IN 46260 USA. Telephone: (317) 872-2877, Fax: (317) 872-5347, E-mail: jp_mjg@msn.com

Table 1.
Complications of pregnant patients undergoing non-gynecologic laparoscopy.

Patient	EGA at Surgery ¹	Procedure	Tocolysis	EGA at Delivery	Delivery Route	Complications
1	23	Laparoscopic Cholecystectomy	MgSO ₄ ² Terb ³ po ⁴	40	Vaginal Delivery	None
2	34	Laparoscopic Cholecystectomy	Terb sq ⁵	37	Cesarean Delivery	Diaphragmatic hernia diagnosed
3	25	Laparoscopic Cholecystectomy	Terb po	38	Vaginal Delivery	None
4	33	Laparoscopic Cholecystectomy	MgSO ₄ Terb po	37	Vaginal Delivery	None
5	14	Laparoscopic Cholecystectomy	None	37	Vaginal Delivery	None
6	19	Laparoscopic Appendectomy	None	39	Vaginal Delivery	None
7	25	Laparoscopic Cholecystectomy	MgSO ₄ Terb po	39	Vaginal Delivery	None
8	17	Laparoscopic Appendectomy	None	39	Cesarean Delivery	None
9	30	Diagnostic Laparoscopy	None	38	Cesarean Delivery	Pulmonary edema

¹Estimated gestational age ²Magnesium sulfate ³Terbutaline ⁴*per os* ⁵Subcutaneous

performed was laparoscopic cholecystectomy (6 patients). The minimum EGA at surgery was 14 weeks and the maximum was 34 weeks. The median estimated gestational age at surgery was 25 weeks (mean 24 weeks). A standard maximum intra-abdominal CO₂ pressure of 15 mm Hg was used. A left upper quadrant insertion of the insufflation needle was used. A 10 - 12 mm trocar could then safely be placed in the same location. Other ports were then placed under direct visualization. No intraoperative external fetal monitoring was performed, but all patients were studied by continuous external fetal monitors and tocodynamometers in the post-anesthesia care unit as well as in antenatal unit. Propafol was used as the induction agent in all cases with inhaled agents utilized for maintenance anesthesia.

Five patients were treated with tocolysis (3 with intravenous magnesium sulfate followed by oral terbutaline

and 2 patients with terbutaline only). One patient's course was complicated by pulmonary edema which was treated by aggressive diuretic therapy. Another patient was found to have a diaphragmatic hernia at the time of her surgery. The procedure was completed successfully, and she subsequently underwent an elective cesarean delivery at 37 weeks EGA to avoid the second stage of labor. All patients delivered at greater than or equal to 37 weeks EGA (median 38 weeks). No infants were admitted to the neonatal intensive care unit. All infants were released from the hospital at their mother's time of discharge.

DISCUSSION

Gallbladder dysfunction increases during pregnancy. In the second and third trimester of pregnancy, the volume of the gallbladder doubles as compared to the normal

non-pregnant state.^{8,9} Although many patients have symptomatic gallbladder disease during pregnancy, surgery has been traditionally delayed until after delivery because of the inherent maternal and fetal morbidities.⁹ In the second or third trimester, cholecystectomy by laparotomy has been found to be associated with a five percent fetal mortality.¹⁰ Because surgeons have been hesitant to perform cholecystectomies in pregnancy, patients suffering from gallbladder disorders have often had to spend prolonged periods in the hospital being treated by more conservative measures.¹¹ Dixon et al. found that second trimester operative treatment of cholelithiasis was associated with shorter hospital stay for patients, as well as a decreased fetal loss rate as compared to patients conservatively managed.¹¹

Over the past few years, reports describing the use of laparoscopic cholecystectomy in pregnancy have emerged in the literature.^{2,4,6,7,12-14} A few reports have followed the pregnancies to delivery.^{7,12,14} In these reports, no increase in preterm deliveries has been found. Only one report mentioned that a patient was successfully tocolyzed when uterine contractions began after surgery.⁷ In the present study, tocolysis was begun at the discretion of the attending obstetrician. Five out of six patients undergoing laparoscopic cholecystectomies received tocolytics; however, only three of six received intravenous tocolytics. The current report not only found that all patients delivered at or greater than 37 weeks EGA, but no newborns from this group were admitted to the neonatal intensive care unit. Previously, the latest EGA at which a laparoscopic cholecystectomy has been reported has been 31 weeks.⁵ In the past year, laparoscopic cholecystectomies have been performed in patients as late in gestation as 33 and 34 weeks EGA in our institution. To minimize the chance of trauma to the uterus (i.e., inadvertent placement of an insufflation needle or trocar into a gravid uterus), left subcostal trocar placements have been used to facilitate placement of supra-umbilical midline ports.

Appendicitis is the most common cause of an acute abdomen in pregnancy.¹⁵ It can be a major source of maternal morbidity and even fetal loss, especially if the appendix ruptures. Traditional therapy has been a laparotomy through a muscle splitting incision over the appendix.¹⁵ Recently, the role of laparoscopy has begun to be explored.^{5-7,14} In published reports, no fetal mortality has occurred. In the current report, two patients had laparoscopic appendectomies in the second

trimester. Both patients were delivered at or greater than 37 weeks EGA. No postoperative complications occurred. The role of tocolysis is unknown following appendectomy by laparotomy.¹⁵ The role of tocolysis following laparoscopic appendectomy has yet to be explored. Neither patient in our account received tocolysis following surgery.

Another reason for abdominal or pelvic surgery in pregnancy is the finding of an adnexal mass.⁵ The role of laparoscopy for evaluation and management of adnexal masses in the second or third trimester is even more controversial than the role of laparoscopic cholecystectomy or appendectomy.^{5,16,17} However, pelvic surgery (a paratubal cystectomy) has been performed as late as 22 weeks EGA.¹⁷

Although no prospective randomized trials have been performed, based on this case series and other reports laparoscopy appears to be safe in the second and third trimester of pregnancy. Although this is only a small series, the routine use of tocolytics after laparoscopy as a prophylactic against preterm delivery does not appear justified. Unless maternal uterine cervical change is noted, tocolytics should not be started. Gabbe et al. note that the use of tocolytics without cervical change (prophylactic tocolytics) has not been shown to decrease the rate of preterm birth; however, this use has not been studied in patients undergoing laparoscopic surgery.¹⁸ As of now, the best management of tocolytic agents appears to be leaving it to the attending obstetrician caring for the involved patient. Our study showed no effect of surgery on pregnancy outcome including EGA at delivery or neonatal intensive care unit admission. In fact, laparoscopic cholecystectomies were performed as late as 34 weeks EGA without any adverse effects on pregnancy outcome.

References:

1. Mazze RI, Kallen B. Reproductive outcome after anesthesia and operation during pregnancy: a registry study of 5405 cases. *Am J Obstet Gynecol.* 1989;161:1178-1185.
2. Morrell DG, Mullins, JR, Harrison PB. Laparoscopic cholecystectomy in pregnancy in symptomatic patients. *Surgery.* 1992;112:856-859.
3. Pucci RO, Seed RW. Case report of laparoscopic cholecystectomy in the third trimester pregnancy. *Am J Obstet Gynecol.* 1991;78:401-402.

4. Howard FM, Vill M. Laparoscopic adnexal surgery during pregnancy. *J Am Assoc Gynecol Laparosc.* 1994;2:91-93.
5. Nezhat FR, Tazuke S, Nezhat CH, Seidman DS, Phillips DR, Nezhat CR. Laparoscopy during pregnancy: a literature review. *JSLs.* 1997;1:17-28.
6. Curet M, Allen D, Josloff RK, et al. Laparoscopy during pregnancy. *Arch Surg.* 1996;131:546-551.
7. Reedy MB, Gala HL, Richards WE, Preece CK, Wetter PA, Kuehl TJ. Laparoscopy during pregnancy: a survey of laparoscopic surgeons. *J Reprod Med.* 1997;42:33-38.
8. Bennion LJ, Grundy SM. Risk factors for the development of cholelithiasis in man. *N Engl J Med.* 1978;29:1221-1227.
9. Samuels P, Landon MB. Hepatic Disease. In Gabbe SG, Niebyl JR, Simpson JL, eds. *Obstetrics: Normal & Problem Pregnancy*, 3rd ed. New York: Churchill Livingstone; 1997:1119-1134.
10. Printen KJ, Ott RA. Cholecystectomy during pregnancy. *Am Surg.* 1978;44:432-434.
11. Dixon NP, Faddis DM, Silberman H. Aggressive management of cholelithiasis during pregnancy. *Am J Surg.* 1987;154:292-294.
12. Gouldman JW, Sticca RP, Rippon MB, McAlhany JC, Jr. Laparoscopic cholecystectomy in pregnancy. *Am Surg.* 1998;64:93-97.
13. Pelosi MA, 3rd, Pelosi MA, Villalona E. Laparoscopic cholecystectomy at cesarean section. A new surgical option. *Surg Laparosc Endosc.* 1997;7:369-372.
14. Gurbuz AT, Peetz ME. The acute abdomen in the pregnant patient. Is there a role for laparoscopy? *Surg Endosc.* 1997;11:98-102.
15. Depp R. Cesarean delivery. In Gabbe SG, Niebyl JR, Simpson JL, eds. *Obstetrics: Normal & Problem Pregnancy*, 3rd ed. Churchill Livingstone; 1997:561-642.
16. Neiswender LL, Toub DB. Laparoscopic excision of pelvic masses during pregnancy. *J Am Assoc Gynecol Laparosc.* 1997;4:269-272.
17. Tazuke SI, Nezhat F, Nezhat CH, Seidman DS, Phillips DR, Nezhat CR. Laparoscopic management of pelvic pathology during pregnancy. *J Am Assoc Gynecol Laparosc.* 1997;4:605-608.
18. Iams JD. Preterm birth. In Gabbe SG, Niebyl JR, Simpson JL, eds. *Obstetrics: Normal & Problem Pregnancy*, 3rd ed. Churchill Livingstone; 1997:743-820.

The authors gratefully acknowledge the support of the John Marten Family Memorial Research Fund, Rod Fasone Memorial Research Fund, and the St. Vincent Hospital Foundation.