

Laparoscopic Management of Adnexal Masses in Pregnant Women

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OBJECTIVE: To report on 14 cases of adnexal masses in the second trimester of pregnancy that were managed with laparoscopic surgery.

STUDY DESIGN: A retrospective study. During the period between January 1994 and January 1998, 14 women presented with adnexal masses in pregnancy and were surgically managed with laparoscopy. A retrospective chart review of these patients was used to determine factors, including gestational age, operating time, length of hospital stay, pathology results, pregnancy outcomes and complications.

RESULTS: Fourteen patients had laparoscopic removal of adnexal masses in their second trimester of pregnancy. Average gestational age was 16 weeks (range, 11.5–21), average operating time was 84 minutes (range, 32–145), and average hospital stay was 2.0 days (range, 1–5). Pathology revealed 4 serous cystadenomas, 3 mucinous cystadenomas, 3 mature teratomas, 3 functional cysts and 1 bilateral endometrioma. There were no postoperative complications except for one case of mild peritonitis, which resolved with expectant management. There were no cases of preterm labor associated with the surgery. Ten pregnancies continued to term without complications and delivered average-sized infants. Three pregnancies

were in the third trimester without complications at this writing. There was one intrauterine fetal death at 31 weeks; it was found to be secondary to an acute cord accident on autopsy remote from surgery.

CONCLUSION: Significant ovarian masses are diagnosed relatively frequently in the pregnant woman. The risk of malignancy is low, but complications resulting from distention, rupture and/or torsion of the adnexa can be a significant concern. As laparoscopic procedures improve and our experience with laparoscopy in the pregnant woman increases, most

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of these patients can forego laparotomy and be managed safely by laparoscopic removal of the mass. This series outlines laparoscopic technique and outcomes after removal of significant adnexal masses in pregnancy. (J Reprod Med 1999;44:97–100)

Keywords: adnexal diseases; laparoscopic surgical procedures; pregnancy complications, neoplastic.

Introduction

The incidence of surgical exploration for adnexal masses in pregnancy ranges from 1:442 to 1:1,300.¹ In 1994, Kohler researched the literature and found

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that approximately 1 in 600 pregnancies are complicated by the presence of an adnexal mass.² This figure is probably conservative as these studies reported mostly masses that had become symp-

There were no major complications in the mother or fetus.

tomatic or large enough to be detected by pelvic examination. Most adnexal masses that are detected are usually found by ultrasound dating studies, are asymptomatic and resolve spontaneously prior to the second trimester. However, if the mass becomes symptomatic, persists into the second trimester or has certain characteristics (Figure 1), then operative intervention is required. Traditionally these cases were approached via laparotomy, with its potential morbidity and significant hospital stay. Since 1990 laparoscopic diagnosis and management of symptomatic adnexal masses has had an emerging role and in the near future may be the procedure of choice in the diagnosis and management of adnexal disease in the pregnant woman. Parker et al recently reviewed laparoscopic management of 29 pregnant women with adnexal masses who had been reported on separately.³ In these cases surgery was completed successfully laparoscopically with no reported maternal or fetal complications. Similar results have been confirmed in several recent, small case reports.⁴⁻⁶ This paper reports on the management of 14 patients with adnexal masses who were successfully treated by laparoscopic surgery during pregnancy.

Subjects and Methods

Between June 1994 and January 1998, 14 women presented with adnexal masses in pregnancy and were surgically managed with laparoscopy at our institution. A retrospective chart review of these patients was used to determine the following factors: patient age, gestational age, presenting symptoms, ultrasound findings, operating time, hospital stay, pathology results, pregnancy outcomes and complications. Twelve of the 14 patients were managed and operated on by the same attending surgeon; all had resident staff assistance.

Placement of the laparoscope and operating trocars was modified according to the uterine size and gestational age. For surgery, all patients were set up

in the dorsal supine position with a leftward tilt to relieve pressure on the inferior vena cava and maximize venous return. General endotracheal anesthesia was used in all patients and end tidal CO₂ closely monitored. Fetal viability was confirmed by doptone prior to and immediately following surgery. A CO₂ pneumoperitoneum was obtained by open placement of the operating trocar with direct visualization of the peritoneal cavity. A standard 10-mm open laparoscopy port was used in most cases. In pregnancies that were more advanced in the second trimester or patients who had size greater than dates secondary to a large adnexal mass, all ports were placed in a more cephalad position in relation to the umbilicus. Lateral operating ports were placed under direct visualization. Peritoneal washings were collected and stored for possible future analysis. In most cases, the adnexal mass was found in the posterior cul-de-sac behind the uterus. The mass was lifted into the abdomen by laparoscopic probes and graspers, and based upon the location and characteristics of the mass, an ovarian cystectomy or oophorectomy and/or salpingectomy was completed and the specimen sent for frozen section. In all cases uterine manipulation was kept to a minimum and avoided totally if possible. In cases of torsion, the adnexa were unwound, checked for viability, and cystectomy or oophorectomy completed. Postoperatively patients were observed closely for increased uterine activity. Routine postoperative prophylactic tocolysis was not used.

Results

Patients in the study group (Table I) had an average age of 28.1 years (range, 22-37), and the average gestational age was 16 weeks (range, 11.5-21). Six patients were diagnosed with masses (all >8 cm with various characteristics) in the first trimester. Three of these six were operated on early in the second trimester secondary to acute pain and persis-

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- Symptomatic and/or rupture (acute abdomen)
 - Surface excrescences or internal papillae
 - Evidence of ascites or carcinomatosis
 - Rapidly growing
 - Solid
 - Complex cyst > 6 cm, persisting beyond 1st trimester
 - Simple cyst > 8 cm, persisting beyond 1st trimester
 - Future impeding of vaginal delivery
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Figure 1 Adnexal masses in pregnancy: indications for surgery

Table I *Laparoscopic Management of Adnexal Masses in Pregnancy*

Patient characteristic	Average	Range
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tence of the mass, with one of these having torsion of the adnexa and mass. The other three were followed and then operated on in the second trimester after the mass failed to regress or grew larger.

Eight patients had pelvic masses that were diagnosed and operated on during the second trimester. Two presented with simple cysts > 10 cm that grew. Three presented acutely with pain and an adnexal mass. All three patients had torsion of the adnexa. The remaining three patients presented with solid/cystic complex masses > 7 cm in diameter with characteristics consistent with teratomas. All three had pathologic confirmation of mature teratomas at the time of surgery.

Average operating time was 84 minutes (range, 32–145). Histologic diagnosis of the tumors revealed 4 serous cystadenomas, 3 mucinous cystadenomas, 3 mature teratomas, 3 functional/hemorrhagic corpus luteum cysts and 1 bilateral endometrioma (Table II). There were no malignant tumors. Three patients required short-term (12-hour) tocolysis secondary to increased uterine activity; two of the three were > 20 weeks pregnant, and the third was 16 weeks pregnant. None of these patients had cervical dilatation or vaginal bleeding. One patient developed mild peritonitis after removal of a dermoid cyst; it resolved within 48 hours postoperatively. Average hospital stay was 2.0 days (range, 1–5). There were no spontaneous abortions or fetal losses following surgery. At this writing, three patients were in the third trimester, with no complications to date. Ten patients continued with uncomplicated pregnancies and delivered infants who were average for gestational age in size at term. One patient had a fetal loss at 31 weeks. Autopsy revealed a diamniotic/monochorionic twin pregnancy with multiple vascular anastomoses between a partial molar placenta that led to an acute vascular accident and intrauterine death. The pregnancy had proceeded in an uncomplicated manner until this event.

Discussion

The current study was the largest series to date describing removal of adnexal masses by laparoscopy in the pregnant woman. Until 1990, laparoscopy was considered absolutely contraindicated in pregnancy. Recently, however, with the advance in technology and skill in laparoscopic surgery, the role of laparoscopy in pregnancy seems to be undergoing redefinition. Diagnostic and therapeutic laparoscopy during pregnancy is being performed at an increasing rate. There have been at least 50 reported cases of laparoscopic cholecystectomy.⁷ Spirtos et al⁸ reported the initial use of laparoscopy to aid in the diagnosis of appendicitis in pregnancy, although laparotomy was used for removal of the appendix. Since then, there have been reports of laparoscopic appendectomy in pregnant women without maternal or fetal complications.⁹

For many years, gynecologic surgeons have been routinely performing diagnostic laparoscopy for the evaluation of adnexal masses and potential ectopic pregnancies.¹⁰ Diagnostic laparoscopy in the first trimester did not seem to have any adverse effects upon the pregnancy if no ectopic pregnancy or disease was found. More recently the laparoscope has been used for surgical treatment in pregnancy as well. Reedy et al recently conducted a national survey that reported on 413 laparoscopic procedures performed in pregnancy for both general surgical and gynecologic disease.¹¹ No adverse fetal or maternal complications seemed to occur above the baseline for the general population or were linked to the laparoscopic procedure. Cholecystectomy was the most common procedure reported. A recent study using the Swedish Health Registry compared laparoscopy and laparotomy in pregnancy.¹² It compared birth weight, gestational duration, growth restriction, infant survival and fetal malformations. There were no differences in these variables for patients undergoing laparoscopy versus laparotomy. However, as compared to the general

Table II *Pathology Results*

Histology	No.
Serous cystadenoma	4
Mucinous cystadenoma	3
Mature teratoma	3
Functional cyst	3
Endometrioma	
Total	14

population, there was an increased risk for infants in both groups of weighing <2,500 g, of being delivered before 37 weeks and of having an increased risk of growth restriction. Previously, an overall rate of fetal loss had been reported as 10–25%, and the preterm delivery rate was approximately 22% after adnexal surgery during pregnancy (emergency and nonemergency).^{13,14} These numbers, however, reflected the approach of laparotomy.

Bordelon and Hunter¹⁵ identified three issues central to laparoscopy and pregnancy: (1) safe laparoscopic access with a gravid uterus, (2) modifications of trocar sites to allow smooth conduct of the procedure in the presence of an enlarged uterus, and (3) identification of the possible adverse effects of a sustained CO₂ pneumoperitoneum upon fetal physiology and blood flow. The first two issues are technical and have been solved fairly easily by open laparoscopy and a more caudad approach for secondary trocar sites. The third issue is the major and most important difference between proven open surgical procedures in pregnancy and the laparoscopic approach as these physiologic effects are not yet known. The pneumoperitoneum affects the fetus in two ways: (1) directly increasing the pressure on the uterus, and (2) altering maternal hemodynamics and acid-base balance.

Hunter et al,¹⁶ after studying pregnant ewes, gave some valuable information on these issues in the maternal-fetal unit with laparoscopic surgery. In summary, he showed no adverse effect from increased pressure alone; however, there was fetal hypercarbia, acidosis, possible tachycardia and an increase in fetal arterial pressure with the use of a CO₂ pneumoperitoneum. Maternal respiratory acidosis is easily corrected by the anesthesiologist, but the end tidal CO₂ may not reflect true PCO₂ and acid-base balance in the fetus. Again, the long-term effects of these physiologic alterations on the fetus are unknown but should be avoided, if possible by close monitoring of maternal indices.

Conclusion

Laparoscopic surgery with diagnosis and removal of adnexal masses during pregnancy appears to be feasible and carries very low morbidity. In this series of 14 pregnant women who had laparoscopic removal of an adnexal mass during the second trimester, there were no major complications in the mother or fetus. The patients benefited from the

minimally invasive procedure, brief hospital stay, quick recovery and no impairment of pregnancy. Although no definitive conclusions on fetal safety during the procedure can be made, the results of this study are encouraging and underscore the need for future study.

References

1. Kort B, Katz VL, Watson WJ: Effect of non-obstetrical operation during pregnancy. *Surg Gynecol Obstet* 1993;177:371–376
2. Kohler, MF: The adnexal mass in pregnancy. *Postgrad Obstet Gynecol* 1994;14:1–5
3. Parker J, Robinson H, Byrne D: Laparoscopic adnexal surgery during pregnancy: A case of heterotopic tubal pregnancy treated by laparoscopic salpingectomy. *Aust NZ J Obstet Gynaecol* 1995;35:208–210
4. Neiswender L, Toub DB: Laparoscopic excision of pelvic masses during pregnancy. *J Am Assoc Gynecol Laparosc* 1997; 4:269–272
5. Della Badia CR, Asper R, Iddenden DA: Laparoscopic removal of a dermoid cyst in pregnancy. *J Reprod Med* 1995; 40:797–799
6. Morice P, Louise-Sylvestre C, Chapron C, et al: Laparoscopy for adnexal torsion in pregnant women. *J Reprod Med* 1997;42:435–439
7. Lanzafame RJ: Laparoscopic cholecystectomy during pregnancy. *Surgery* 1995;118:627–633
8. Spirtos NM, Eisenkop SM, Spirtos TW, et al: Laparoscopy: A diagnostic aid in cases of suspected appendicitis: Its use in women of reproductive age. *Am J Obstet Gynecol* 1987; 156:90–94
9. Schriber JH: Laparoscopic appendectomy in pregnancy. *Surg Endosc* 1990;4:100–102
10. Samuelson S, Sjoval A: Laparoscopy in suspected ectopic pregnancy. *Acta Obstet Gynecol Scand* 1972;51:31–33
11. Reedy MB, Galan HL, Richards WE: 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; 177:673–679
13. Struyk AP, Treffers PE: Ovarian tumors in pregnancy. *Acta Obstet Gynecol Scand* 1984;63:421–424
14. Katz VL, Watson WJ, Hansen WF, et al: Massive ovarian tumor complicating pregnancy: A case report. *J Reprod Med* 1993;38:907–910
15. Bordelon BM, Hunter JG: Laparoscopy in the pregnant patient. *In Laparoscopic Surgery*. Edited by GH Ballantyne, PF Leahy, IM Modlin. Philadelphia, WB Saunders, 1992, pp 69–76
16. Hunter JG, Swanstrom L, Thornburg K: Carbon dioxide pneumoperitoneum induces fetal acidosis in a pregnant ewe model. *Surg Endosc* 1995;9:272–279