FERTILITY AND STERILITY®
VOL. 81, NO. 1, JANUARY 2004

Published by Elsevier Inc.
Printed on acid-free paper in U.S.A.

Laparoscopic management of tubal ectopic pregnancy in obese women

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Objective: To study the surgical morbidity associated with the laparoscopic management of tubal ectopic pregnancy in an overweight population compared with a lean population.

Design: Retrospective study.

Setting: An academic tertiary referral obstetrics and gynecology center.

Patient(s): One hundred seventeen patients in two groups, lean (n = 90; body mass index ≤ 30) and obese (n = 27; body mass index >30) who had pathology-confirmed tubal ectopic pregnancies that were managed laparoscopically. Each group was subdivided into a laparoscopically managed group and a group in which laparoscopy was converted to laparotomy.

Intervention(s): None.

Main Outcome Measure(s): Operative time, blood loss, and complications of laparoscopic surgery as well as causes of conversion from laparoscopy to laparotomy, in obese compared with lean women, with ectopic pregnancy.

Result(s): There was no significant difference in gestational age; β-hCG level; or history of previous surgeries, ectopic pregnancy, pelvic inflammatory disease, or endometriosis or in any of the studied outcomes (conversion rate, blood loss, and operative time) between the lean and obese groups or their respective subgroups except for operative time between obese women who underwent laparotomy, which was significantly longer when compared with the case of lean women who underwent laparotomy. Intraoperative and postoperative complications were comparable between the lean and obese groups, and all complications occurred in the completed-laparoscopy group.

Conclusion(s): Laparoscopic management of tubal ectopic pregnancy does not appear to significantly increase surgical morbidity in obese patients. (Fertil Steril® 2004;81:198–202. ©2004 by American Society for Reproductive Medicine.)

Key Words: Laparoscopy, ectopic pregnancy, body mass index (BMI), obesity

Ectopic pregnancy is a major cause of maternal morbidity and mortality with increasing incidence worldwide (1–3). In the United States, the annual incidence of ectopic pregnancy has increased more than five times, from 0.37% of pregnancies in 1948 to 1.97% in 1992 (4). Despite the continued rise in incidence, there was almost a 90% decline in the rate of death from ectopic pregnancy from 1979 to 1992 (4). However, ectopic pregnancy is still responsible for a significant proportion of maternal mortality as the third most common cause of maternal mortality in the United States, comprising about 9% of all such deaths (1).

Medical treatment of ectopic pregnancy using methotrexate has been widely accepted. Use of other agents such as mifepristone, prostaglandin, and potassium chloride has also been reported. However, with tubal pregnancy accounting for the vast majority of ectopic pregnancy, most patients still undergo operative management for the diagnosis and treatment of this condition. (5–10).

Operative laparoscopy has been widely accepted as the surgical mode of choice for ectopic pregnancy. However, performing such surgery in the obese patients is technically challenging and frequently frustrating. Obesity, defined as body mass index (BMI) of >30 by most authors in the literature (11–15), is considered by some to be a relative contraindication to operative laparoscopy (16), although a

Received December 3, 2002; revised and accepted May 19, 2003.
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0015-0282/04/$30.00
doi:10.1016/j.fertnstert.2003.05.025

few studies have shown the safety of this type of operation in such populations (11, 17, 18).

To our knowledge, no study in the literature thus far has specifically addressed the safety and efficacy of laparoscopy in the treatment of ectopic pregnancy in the obese population. The purpose of this study is to address the above issues in the setting of an academic teaching institution. We studied the characteristics and outcome of laparoscopic management of tubal ectopic pregnancy in obese women compared with in lean women.

MATERIALS AND METHODS

After obtaining approval of the institutional review board at the Children's Hospital of Buffalo, we conducted a retrospective review in the Department of Gynecology and Obstetrics at the University at Buffalo, State University of New York, of all pathology-confirmed tubal ectopic pregnancies that were surgically treated between January 1995 and June 2000 at the Children's Hospital of Buffalo, an academic tertiary referral center.

Patients who were hemodynamically unstable or who underwent laparotomy directly were excluded. Patients were included who had undergone laparoscopy as part of the operative procedure. All cases were performed by senior residents under the supervision of various attending physicians in the Department of Gynecology and Obstetrics.

The following patients' characteristics were recorded: age, height, and weight of the patients as well as gestational age of the ectopic pregnancy and quantitative β-hCG level. Conditions that predispose to adhesion formation, including prior surgeries and previous ectopic pregnancy, as well as gynecologic history of pelvic inflammatory disease and endometriosis, were recorded. Other relevant data including gravidity and parity, as well as ultrasound findings such as gestational sac diameter, presence of fetal heart activity, and free peritoneal fluid, were also obtained.

Body mass index was calculated (in kilograms per square meter), and subjects were divided into an obese or large group (BMI >30.0) and a nonobese or lean group (BMI ≤ 30.0). They were each further divided into two subgroups: those who had successful laparoscopy (laparoscopy group) and those who had laparoscopy converted to laparotomy (laparotomy group).

The following outcome measures were collected using operative and anesthesia records: estimated surgical blood loss, operative time, reasons for conversion from laparoscopy to laparotomy, and operative complications, as well as the type of surgery performed and length of hospital stay. Estimated surgical blood loss was defined as blood loss from surgery itself, excluding preexisting blood loss found on entry into the abdomen. Operative time was defined as time between starting and finishing the procedure (between skin incision and skin closure). Complications were recorded as intraoperative (pelvic organ or vascular injury) and postoperative (adverse events occurring during hospitalization).

Subject characteristics as well as the outcome measures were compared between each corresponding patient group: lean patients who had laparoscopy vs. obese patients who had laparoscopy and lean patients who had laparoscopy converted to laparotomy vs. obese women who had laparoscopy converted to laparotomy.

Statistical Analysis

Both Student's t test and χ^2 tests were used for comparison of the mean of the various characteristics and outcome measures, when appropriate between the corresponding groups. $P<.05$ was considered statistically significant. The statistical tests were performed with SigmaStat for Windows, version 1.0, software (SigmaStat Software HighEdit Professional, MicroHelp Inc and HeilerSoftware GmbH, San Rafael, CA).

RESULTS

A total of 129 patients was identified to have pathologically documented tubal ectopic pregnancy that was treated surgically. One hundred seventeen of those were included in the study. Twelve were excluded: 10 for hemodynamic instability and direct laparotomy and 2 for incomplete height and weight record.

There were 90 patients in the lean group (BMI ≤ 30) and 27 in the obese group (BMI >30). All patients had undergone laparoscopy as the initial operative procedure. In the lean group, laparoscopy was completed successfully in 66 patients (lean laparoscopy subgroup) and was converted to laparotomy in the remaining 24 patients (lean laparotomy subgroup). In the obese group, laparoscopy was completed successfully in 19 patients (obese laparoscopy subgroup) and was converted to laparotomy in the remaining 8 patients (obese laparotomy subgroup).

The general characteristics of the patients as well as conditions that predispose to adhesion formation such as previous surgeries, ectopic pregnancy, endometriosis, and pelvic inflammatory disease are shown in Tables 1 and 2. The BMI was statistically significantly different between the lean and obese groups. However, there was no statistically significant difference in the patients' age, gestational age, or β-hCG level between the two study groups and their respective subgroups. There was no significant difference between each corresponding patient group as to gravidity, parity, ultrasound findings (data not shown), and other characteristics.

The following surgical procedures were carried out laparoscopically or during laparotomy in both lean and obese groups, including any or a combination of the following: salpingectomy, salpingostomy, fimbriectomy, lyses of adhesion, and evacuation of the products of conception. There

TABLE 1

Patients' characteristics among the four patients' groups.

Parameter	Lean patients who had laparoscopy (n = 66)	Obese patients who had laparoscopy (n = 19)	*P* value	Lean patients who had laparoscopy converted to laparotomy (n = 24)	Obese patients who had laparoscopy converted to laparotomy (n = 8)	*P* value
BMI	23.4 ± 3.2 (17.6–29)	34.4 ± 3 (30.7–43)	.0001	23.2 ± 2.4 (20–29)	36.4 ± 6.8 (30.5–54.4)	.0001
Age (y)	27.4 ± 6.2 (15–42)	29.6 ± 5.9 (18–39)	NS	27.2 ± 6.3 (16–38)	29.2 ± 6 (21–39)	NS
Gestational age (wk)	5.5 ± 1.7 (4–12)	6.7 ± 1.5 (4–9)	NS	7.5 ± 2.8 (4–12)	7.6 ± 1.8 (5–11)	NS
β-hCG (IU/mL)	7,141 ± 12,690 (60–76,019)	4,706 ± 5,279 (716–20,000)	NS	9,637 ± 10,676 (424–36,906)	7,774 ± 5,456 (1,184–16,778)	NS

Note: Data are presented as mean ± SD (range). NS = not significant.

Hsu. Laparoscopy in obese women with tubal ectopic pregnancy. Fertil Steril 2004.

was no difference in the number of various types of surgical procedures among the study groups (data not shown).

Table 3 shows the mean of the estimated blood loss and operative time among the four groups. There was no statistically significant difference in the estimated blood loss or operative time between the lean and obese groups or their respective subgroups, except for operative time between obese and lean women who underwent laparotomy. The former group had a significantly longer time than the latter one (mean ± SD: 126 ± 30 minutes compared with 89 ± 29 minutes, $P=.003$).

The conversion rates from laparoscopy to laparotomy were 26.7% (n = 24/90) and 29.6% (n = 8/27) in the lean and obese patients, respectively. The difference was not

TABLE 2

Conditions that predispose to adhesion formation among the four patients' groups.

Characteristics	Lean patients who had laparoscopy (n = 66)	Obese patients who had laparoscopy (n = 19)	Lean patients who had laparoscopy converted to laparotomy (n = 24)	Obese patients who had laparoscopy converted to laparotomy (n = 8)
Previous surgery	35 (53)	9 (47.4)	11 (45.8)	4 (50)
Previous ectopic pregnancy	19 (28.8)	3 (15.8)	4 (16.6)	2 (25)
Previous PID	13 (19.7)	0	9 (37.5)	2 (25)
History of endometriosis	3 (4.6)	0	2 (8.3)	0

Note: Data are presented as n (%). *P* values were not significant for all lean–obese comparisons. PID = pelvic inflammatory disease.

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TABLE 3

Estimated blood loss and operative time among the four patients' groups.

Parameter	Lean patients who had laparoscopy (n = 66)	Obese patients who had laparoscopy (n = 19)	*P* value	Lean patients who had laparoscopy converted to laparotomy (n = 24)	Obese patients who had laparoscopy converted to laparotomy (n = 8)	*P* value
Conversion rate (%)	—	—	—	(26.7)	(29.6)	NS
Estimated blood loss (mL)	88 ± 85 (50–500)	133 ± 139 (50–600)	NS	157 ± 122 (50–500)	222 ± 172 (100–500)	NS
Operative time (min)	94 ± 28 (50–160)	114 ± 51 (55–230)	NS	89 ± 29 (45–155)	126 ± 30 (70–170)	.003

Note: Data presented as mean ± SD (range). NS = not significant.

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significant. The reasons for conversion from laparoscopy to laparotomy in the lean patients were as follows: adhesions (n = 9), active bleeding at gestational site (n = 11), cornual pregnancy (n = 2), and inaccessible gestational sac (n = 2). The reasons for conversion in the obese patients included adhesions (n = 2), active bleeding at gestational site (n = 4), abdominal entry difficulty (n = 2), and ventilation difficulty (n = 1). These were comparable between the two groups, with only three patients in the obese group having reasons directly related to their obesity (abdominal entry difficulty and ventilation difficulty).

All intraoperative and postoperative complications occurred in the completed laparoscopy subgroups. Intraoperative complications in lean women were bleeding from the lateral trocar site (n = 2) and bleeding from serosal laceration of transverse colon from insertion of trocar, requiring a second laparotomy (n = 1). Intraoperative complications in the obese group were pulmonary edema from overhydration, resulting in difficulty in extubation (n = 1). Postoperative complications were ileus in one patient in each group and, in lean women, one patient with subsequent endometritis. There was no difference in the duration of hospital stay between each corresponding group.

DISCUSSION

Ectopic pregnancy remains a common gynecologic condition that causes significant maternal morbidity and mortality. With tubal pregnancy accounting for about 95% of ectopic pregnancies (17), operative laparoscopy has become the preferred mode of operation for those patients who have contraindications to or who have failed medical treatment. Randomized studies have shown that laparoscopy confers less operative time, less blood loss, shorter hospital stay, and lower cost compared with laparotomy (18, 19), and different techniques have been advocated to increase the safety of laparoscopic surgery, such as open laparoscopy (20).

Laparoscopic surgery in the obese population, on the other hand, can be challenging. Increased abdominal wall thickness provides difficulty in achieving pneumoperitoneum and visualizing the inferior epigastric vessels. Moreover, the increased omental and retroperitoneal fat limits maneuverability of instruments (11). In addition, increased airway pressure makes ventilation difficult in these patients, especially when they are placed in the Trendelenberg position (11). Despite these potential problems, such operation has been reported to be safe in a few reports in the gynecologic literature (11, 21, 22). However, these studies included a variety of operative procedures and wide range of indications.

The aim of the present study, therefore, is to determine the safety and efficacy of laparoscopic surgery in obese women with the one and the same indication—tubal ectopic pregnancy. In the present study, subject characteristics and length of hospital stay were similar in women with high and low BMI and their respective subgroups who underwent laparoscopy or laparoscopy and laparotomy.

Contrary to the report of Eltabbakh et al. (11), but in agreement with the findings of Mirhashemi et al. (21), obese patients in our study did not have a significantly higher rate of conversion than nonobese patients. The failure of laparoscopy, resulting in conversion to laparotomy, does not appear to be related to obesity in most of the cases (adhesions or active bleeding from the gestational site account for more than two thirds of them). Conversion to laparotomy occurred in only 3 of the 27 cases in the large group because of factors related to obesity (failure of trocar insertion in 2 patients and difficulty of ventilation in 1 patient). However, our data are limited because of the retrospective nature of the study and sample size.

Estimated surgical blood loss and operative time were not significantly different in obese and lean patients in the laparoscopy group, which is consistent with the case of other studies (11, 21). Operative time, however, was significantly longer in obese patients who underwent conversion, compared with the case of lean patients. Again, this most likely is secondary to the technically challenging aspect of the laparotomy part rather than the laparoscopy part of the procedure during operations in this population.

Interestingly, complications occurred more frequently in lean patients than in the obese patients, with two lacerations of inferior epigastric vessels and one bowel injury in the former group. As Bateman et al. (23) found, most operative injuries in laparoscopy resulted directly from the insertion of either Veress needle or trocar. Although different techniques of creating pneumoperitoneum seem to be favored by gynecologists and general surgeons, no single method of trocar insertion appeared to be superior (24). In our patient groups, there was no single method that was performed more frequently in the obese group than the lean group.

The operative time in this study appears to be longer than that reported in the literature (25, 26). As there is definitely a learning curve for performing laparoscopic procedures, the involvement of the residents who act as the primary surgeons in these cases may be the reason.

In conclusion, this study, although limited by its retrospective nature, appears to support the notion that with proper patient selection and increased experience of gynecologic surgeons, laparoscopic treatment of ectopic pregnancy in the obese population is feasible and safe. It seems that in the overweight population, laparoscopic management of ectopic pregnancy is not associated with significant increase in surgical morbidity when compared with the case in the lean population.

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