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Original Research Article

Comparison between laparoscopic and open appendectomy in pregnant women

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ABSTRACT

Background: Acute appendicitis is the most common indication for surgical emergency in normal patients and also in pregnant women. The objective of this study was to study the clinical significance of a laparoscopic over an open approach to appendicectomy pregnant population.
Methods: Total 46 cases patients with acute appendicitis confirmed the diagnosis by clinical examination and ultrasonography. The patients were divided into two groups laparoscopic appendectomy (group 1) n=21 and Open appendectomy (group 2) n=25. We retrospectively analyzed the medical records to compare the 2 groups.
Results: All the demographic details are not significant when compared with each other. Laparoscopic appendectomy is significantly i.e. <p-value <0.05 less time for operation, length of stay in hospital and complication when compared with open procedure. Time to first flatus, leucocyte and neutrophil ratio are not significantly when compared laparoscopic appendectomy and open appendectomy. Preterm delivery, birth weight, APGAR score, gestational age at delivery, delivery type, fetal loss and maternal death were not significant when compared laparoscopic appendectomy and open appendectomy.
Conclusions: Laparoscopic procedure is safe and effective technique for the treatment of appendicitis during pregnancy with nearly similar rates of complications compared to open procedure. Laparoscopic appendectomy associated with shorter hospital stay, faster return to daily activities and shorter time to first flatus.

Keywords: Acute appendicitis, Appendicectomy, Laparoscopic procedure

INTRODUCTION

Acute appendicitis is the most common indication for surgical emergency in general population and also in pregnant women affecting from 1 in 800 for pregnancies worldwide.[1]

Rate of perforation during pregnancy is reported to be as high as 43% compared to 19% in the population.[1] Treatment of acute appendicitis in pregnant patients is surgical intervention i.e. either with open or laparoscopic appendectomy, similarly to the general population. As laparoscopic technique less postoperative pain, shorter length of hospital stay, decreased incidence of thromboembolic events, faster recovery, improved cosmetic outcome, and decreased rates of postoperative ileus is the preferred method for treating appendicitis in the general population a due to its numerous advantages over the open technique, i.e. Despite the initial absolute or relative contraindication of laparoscopic surgical procedures during pregnancy, in the last decade LA has been performed in pregnant women. Although there have been no prospective randomized controlled trials studying LA in pregnant women, several reports have documented the feasibility, safety and effectiveness of LA in this population.[2,3]

Appendicitis during pregnancy has been reported to increase poor pregnancy outcomes such as fetal loss, preterm labor, as well as perinatal morbidity and mortality.[4,5] The rate of fetal loss is reported to be 20% in perforated appendicitis as compared to 1.5% for uncomplicated appendicitis. If any delay in the diagnosis of acute appendicitis increases the risk of complications in the mother and the fetus.[6,7] Hence we have evaluated clinical outcomes of a laparoscopic appendectomy compared with Open appendectomy in pregnant women.

METHODS

A total number of 46 cases of acute appendicitis have been studied between October 2013 to September 2015. Study confirmed the diagnosis of acute appendicitis by clinical examination and ultrasonography. All patients received preoperative and postoperative obstetric consultations and fetal monitoring. Pregnant women underwent surgery for appendectomy, with the confirmed diagnosis of appendicitis on pathologic examination, were included in the study. The patients were divided into two groups laparoscopic appendectomy (group 1) n=21 and open appendectomy (group 2) n=25. We retrospectively analyzed the medical records to compare the 2 groups.

Preoperative clinical data included age, body mass index (BMI), gestation age at operation, incidence of previous Caesarean section and accuracy of the diagnostic ultrasound. Perioperative data included the duration of surgery, return to normal bowel movement, return to adequate oral intake, length of stay in hospital (LOS), postoperative complications and final pathology. Obstetric and fetal data included gestation age at delivery, incidence of preterm labour, delivery type, birth weight, APGAR scores at 1 minute and 5 minutes, and fetal mortality.

Laparoscopic procedure

The patient was placed on the table in the supine position with a slight left side tilt (20° - 30°). We performed the procedure with the patient under general anesthesia and maintained continuous end-tidal CO2 monitoring within the physiologic range (30 - 40 mm Hg). Routinely, we inserted a Foley catheter, used pneumatic compression devices on the legs and administered prophylactic antibiotics intravenously before the incision. In all patients, we entered the peritoneal cavity using the Hasson open technique, and the procedure was performed using 3 ports.

First, we inserted a 10-mm balloon trocar (telescope route) supraumbilically according to the size of the uterus (3-4 cm above the uterine fundus), and pneumoperitoneum (10-12 mm Hg) was achieved by CO2 insufflation. Subsequently, 2 working 5 mm trocars were inserted, depending on the gestation age. The appendix was then elevated using left-handed forceps, and the mesoappendix was divided using a harmonic scalpel. The appendiceal stump was ligated using endo-loop and transected using endo-scissors. The specimen was removed through the umbilical port site. One closed suction drain was left next to the appendiceal stump.

RESULTS

Total 46 patients with acute appendicitis operated laparoscopic appendectomy (group 1) or open appendectomy (group 2) confirmed the diagnosis by clinical examination and ultrasonography.

All the demographic details are not significant when compared with each other.

Table 1: Demographic details.

Variable	Group -1 (n=21)	Group-2 (n=25)	P-Value
Age in years	28.9±3.2	30.9±4.4	0.53
BMI	21.2±2.3	22.2±3.2	0.78
Gestational age of fetus in week	15.9±5.2	15.7±4.3	0.84
Parity	0.81±1	1.1±1.2	0.23
Gravida	2.11±1.2	2.4±1.4	0.24
Previous caesarean section	7 (33%)	8 (32%)	0.61
False positive USG	2 (10%)	2 (8%)	0.78

Laparoscopic appendectomy is significantly less time for operation, length of stay in hospital and complication when compared with open procedure. Time to first flatus, leucocyte and neutrophil ratio are not significantly when compared laparoscopic appendectomy and open appendectomy. Preterm delivery, birth weight, APGAR score, gestational age at delivery, delivery type, fetal loss and maternal death were not significant when compared laparoscopic appendectomy and open appendectomy.

Table 2: Variables of women underwent laparoscopic appendectomy or open appendectomy.

Variable	Group -1 (n=21)	Group-2 (n=25)	P-Value
Operation time in min (mean±SD)	48.5±12.41	37.81±10.64	0.004*
Length of stay in hospital, in days (mean±SD)	2.25±2.45	4.28±3.31	0.005*
Delay time to operation in hours (mean±SD)	17.43±10.19	15.97±11.88	0.84
Time to first flatus, hours (mean±SD)	3.5±0.4	3.8±0.7	0.91
Complication	0	1 (4%)	0.01*
Lecocyte (mean±SD)	14.1±5.7	14.5±5.6	0.93
Neutrophil ratio (mean±SD)	81.2±11	77.9±13	0.52

Table 3: Comparison of obstetric and fetal outcomes of those women in study.

Variable	Group -1 (n=21)	Group-2 (n=25)	P-Value
Preterm delivery (n, %)	4 (19%)	5 (20%)	-
Birth weight in Kgs (mean±SD)	3.02±0.7	2.99±0.7	0.76
APGAR score at 1min. (mean±SD)	7.43±1.19	6.77±1.8	0.43
Gestational age at delivery in weeks (mean±SD)	38.34±3.56	37.71±4.86	0.87
Delivery type			
Vaginal delivery (n, %)	15 (71%)	18 (72%)	0.55
Cesarean delivery (n, %)	6 (29%)	7 (28%)	
Fetal loss	1 (5%)	1 (4%)	0.42
Maternal death	0	0	0

DISCUSSION

Diagnostic imaging studies are often used to clarify a confusing clinical picture. Ultrasonography is widely used diagnostic test because of its safety for the mother and fetus and its relatively high sensitivity and specificity for many intra-abdominal processes.[8] In our study, ultrasonography was performed in all patients; acute appendicitis was found in 21 patients in the LA group and 25 in the OA group.

There is no evidence that the benefits of OA outweigh those of LA in pregnant women with respect to perioperative morbidity and mortality. In the present study, there is no significant difference between demographic details in both the groups. Our study has no significant difference in perioperative morbidity and mortality compared with OA. Laparoscopic appendectomy is significantly less time for operation, length of stay in hospital and complication when compared with open procedure.[9] Laparoscopic technique is the preferred method for treating appendicitis in the general population due to its numerous advantages over the open technique, i.e. shorter length of hospital stay, decreased incidence of complications as thromboembolic events, faster recovery, improved cosmetic outcome, and decreased rates of postoperative ileus.[10]

Wilasrusmee et al, suggested that laparoscopic appendectomy in pregnancy results in an almost two-fold higher risk of fetal loss as compared to open appendectomy.[8] In another systematic review of LA in pregnancy, which included 28 articles, the authors noticed that laparoscopic approach in pregnancy was associated with a significantly higher rate of fetal loss as compared to open procedure.[11] On the other hand, many studies confirmed the safety and effectiveness of LA during pregnancy.

In present study Preterm delivery, birth weight, APGAR score, gestational age at delivery, delivery type, fetal loss and maternal death were not significant when compared laparoscopic appendectomy and open appendectomy. In study done by Chul J et al, enrolling 61 patients who underwent appendectomy (22 laparoscopic and 39 open), and showed no differences in terms of surgery duration, postoperative complication rate, obstetric and fetal outcomes, including incidence of preterm labor, delivery mode, gestation age at delivery, birth weight and APGAR scores.[12] These authors suggested that LA should be considered as a standard treatment alternative to OA. In another large case series of 45 pregnant women who underwent LA, the authors reported low rate of preterm delivery and absence of fetal loss after laparoscopic appendectomy.[13]

Study results also prove safety of laparoscopic procedure because there were no differences in terms of perioperative morbidity and mortality. Our study show that laparoscopic procedure is more advantageous over open with regard to shorter hospital stay, and faster time to first flatus.

Achieving pneumoperitoneum during laparoscopy is another concern. The CO_2 used for pneumoperitoneum is

associated with pulmonary effects in pregnant women and a potential risk for acidosis in the fetus. It has been recommended that intra-abdominal pressure should be maintained at less than 12 mm Hg to avoid worsening pulmonary physiology in pregnant women.[14] Previously published animal studies reported no adverse fetal effects of CO2 insufflation when the maximal intra-abdominal pressure was limited to 10-12 mm Hg for less than 60 minutes.[15] Although studies have demonstrated that laparoscopic surgery can be performed safely during any trimester with good maternal and fetal outcomes, the long-term effects on the child after delivery have not been well studied.[16] In the present study, intra-abdominal pressure was maintained at 10-12 mm Hg and the mean duration of surgery was 48.5±12.41 minutes.

Stasis of blood in the lower extremities is common during pregnancy, so pregnant women are at high risk for thromboembolitic complications. According to the SAGES guidelines, intraoperative and postoperative pneumatic compression devices and early postoperative ambulation are recommended to prevent deep vein thrombosis in pregnant patients. In the present study, we routinely used pneumatic compression devices, and there were no thromboembolitic complications.

CONCLUSION

Study results demonstrated that laparoscopic procedure is safe and effective technique for the treatment of appendicitis during pregnancy with nearly similar rates of complications compared to open procedure. Laparoscopic appendectomy associated with shorter hospital stay, faster return to daily activities and shorter time to first flatus. Thus, it is the preferred alternative to open surgery in pregnant patients.

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