

Comparison of the Effects of Laparotomy and Laparotomy during Non-Obstetric Procedures on the Mother and the Foetus

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Abstract

Introduction: With laparoscopy, superior newborn care facilities, pre- and post-operative intensive care for the female patient, the dangers connected with pregnancy surgeries are significantly minimised.

Aim: The purpose of the current experiment was to determine whether laparoscopy during pregnancy is as helpful as open surgery in non-pregnant participants, including a decrease in surgical time, postoperative infection, and perioperative hospital stay.

Method: Admission for surgery, age, gestational age, twins or a single foetus, surgery type, weight, age, hospital stay, intraoperative time and complications, contraction, post-operative complications, time of birth, and readmissions from surgery to delivery were all taken into account in 45 females. Fetal outcomes include foetal age at delivery, birth weight, gender, congenital defects, length of hospital stay, and perinatal mortality. The gathered information was evaluated statistically.

Result: The results were statistically significant for the mean length of hospital stay, which was 3.7 ± 3.6 for laparoscopy and 5.3 ± 3.2 for open surgery with a p-value of 0.1206. Laparoscopy took longer than other surgical procedures to complete, with a mean time of 22.0 ± 8.20 and a statistically significant p-value of 0.0137. Additionally, there were less post-operative problems in the laparoscopic group (17.5% versus 47.5% in laparotomy).

Conclusion: According to the results of the current study, laparoscopy for non-obstetric surgeries consistently produces better mother and foetal outcomes than open surgery, regardless of the gestational age at delivery, the length of the operation, or foetal death.

Keywords: Laparoscopy, laparotomy, maternal outcome, fetal outcomes, pregnancy surgery, non-obstetric surgery

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Introduction

Pregnant women undergo a variety of surgical procedures to treat maternity-related illnesses and minimise injury to the

growing foetus at the same time. When acute conditions requiring surgery are present during pregnancy, both the mother's

and the foetus' death rates increase. These illnesses also have a significant impact on maternal and foetal outcomes after pregnancy. However, the risk-benefit ratio for mother and foetus should be carefully considered before the treatment strategy for such cases—requiring abdominal surgeries—is developed. Despite the risk, maternal outcome and health are prioritised since they influence the health of the foetus. Preoperative and postoperative intensive care for women, as well as modern neonatal care facilities in hospitals, significantly lower the related risks. Despite modern advancements, any surgical treatment performed during pregnancy should be done with utmost caution [1-3]. A bowel blockage, appendicitis, and/or cholecystitis are just a few of the disorders that require emergency surgical procedures when pregnant. Miscarriage, ligament stretch, ectopic pregnancy, and/or placenta abruption are further examples of this type of disorder [4]. While early and adequate diagnosis and treatment are beneficial for both the foetus and the pregnant woman, pregnancy itself compromises this accuracy because of several physiological changes that take place during the process. These include appendix displacement, physiologic leucocytosis, and muscular laxity obscuring peritoneal signs [5]. Pregnancy-related surgeries are uncommon, occurring in as few as 1 in 833 pregnant women, and are often delayed until after deliveries. About 25% of surgeries are abdominal surgeries, which make up the majority of surgeries done during pregnancy [6]. These include appendectomy, cholecystectomy, and intestinal blockage. Surgery during the first trimester should be avoided as it increases the risk of foetal teratogenesis and abortion. Surgery is favoured during the second trimester because it carries the fewest risks because third-trimester operations result in preterm delivery [7]. The initial purpose of laparoscopic procedures during pregnancy was to identify heterotopic and ectopic pregnancies. Later laparoscopic procedures

included intestinal resection, hernia repair, adhesion lysis, adrenalectomy, liver biopsy, splenectomy, lymphadenectomy, cholecystectomy, nephrectomy, and/or appendectomy. Because laparoscopic procedures have little to no impact on the uterus and hence cause fewer post-operative complications including abortions and preterm deliveries, they are also utilised to identify a variety of disorders. The two procedures that women undergo during pregnancy most frequently are still cholecystectomy and appendectomy [8,9]. In order to determine whether laparoscopy in pregnancy is as advantageous as open surgery in non-pregnant participants, including a reduction in surgical time, postoperative infection, and hospital stay peri-operatively, the current experiment was conducted. Additionally, post-surgical results of laparoscopic procedures compared to appendectomy, laparotomy, and cholecystectomy were evaluated in terms of teratogenicity, abortions, perinatal deaths, stillbirths, birth weight, and foetal age at delivery.

Methodology:

The objective of the current research was to see whether laparoscopy during pregnancy is as advantageous as open surgery in non-pregnant participants, including a decrease in surgical time, postoperative infection, and postoperative hospital stay. Additionally, post-surgical results of laparoscopic procedures compared to appendectomy, laparotomy, and cholecystectomy were evaluated in terms of teratogenicity, abortions, perinatal deaths, stillbirths, birth weight, and foetal age at delivery. The information about the pregnant women who underwent surgery was gathered from the institute's medical files.

The spleen, digestive system, and/or endocrine systems were operated on in the included cases. Finally, 45 ladies who matched the inclusion criteria were counted

in the study. With a mean age of 23.0 years, the included individuals were 45 females between the ages of 21 and 33. The institute's ethical committee provided approval for the procedure. Surgery for obstetrical problems, such as abdominal cerclage, medical conditions, ectopic pregnancies, ovarian cyst removal, and non-intra-abdominal procedures including open hernia (inguinal/umbilical) and open cholecystectomy were excluded from the study.

In terms of maternal outcomes, the following characteristics were taken into consideration: foetal loss resulting from abortion (therapeutic or accidental), stillbirths, vaginal deliveries, caesarean deliveries, and labour induction where necessary.

The acquired data were evaluated statistically, and statistical significance was maintained at p-value of 0.04.

Results:

The main objective of the current experiment was to determine whether laparoscopy during pregnancy is as advantageous as open surgery in non-pregnant participants, including a decrease in surgical time, postoperative infection, and postoperative hospital stay. Laparoscopic operations over appendectomy, laparotomy, and cholecystectomy were also evaluated for post-surgical outcomes both maternal and foetal in terms of teratogenicity, abortions, perinatal deaths, stillbirths, birth weight, and foetal age at delivery.

With a mean age of 23.0 years, the included individuals were 45 females between the ages of 21 and 33. Laparotomy and laparoscopy were compared for various foetal and maternal outcomes for the 45 females who were enrolled, and the results are shown in Table 1.

Table 1: Pregnancy laparoscopy versus laparotomy: effects on mother's and foetus' health

Parameter	Laparoscopy	Laparotomy	P-Value
Age range	21-33 yrs	23-32	-
Mean age (yrs)	23.1 yrs	25.0 yrs	-
Fetal age at surgery	16.2 ± 7.3	21.1 ± 8.1	0.0348
Hospital stay	3.7 ± 3.6	5.3 ± 3.2	0.1206
Surgery time (min)	86.1 ± 47.1	80.1 ± 32.5	0.6107
Avg time from surgery to birth	22.1 ± 8.20	15.4 ± 9.5	0.0137
Vaginal Delivery	38.6 ± 2.1	37.4 ± 5.0	0.2953
Caesarean Delivery	58.5%	79.6%	-
Preterm deliveries	41.3%	20.2%	-
Weight in birth (kg)	12.0%	20.1%	-
Low birth weight	3.31 ± 0.61	2.90 ± 0.73	0.0430
Complications in surgery	2.3 %	5.5%	-
Post-OP complications	17.5%	47.5%	-
Contraction after surgery	2.1%	19.0%	-

The outcomes for the mother and foetus in laparoscopic and laparotomy operations were shown to be significantly different. The results were significant for both laparoscopy and open surgery, with a p-value of 0.1206 for the mean length of stay in the hospital being 3.7 ± 3.6 and 5.3 ± 3.2, respectively.

Laparoscopy and laparotomy significantly differed in the length of time it took to deliver the baby and the weight at birth of the newborns. With a mean value of 22.0 ± 8.20 for laparoscopy and 15.4 ± 9.5 with a statistically significant p-value of 0.0137 for open surgery, the time from operation to delivery was longer for

laparoscopy. With a mean value of 3.31 ± 0.61 and a p-value of 0.030, the infant weight at delivery was greater in the laparoscopy group and lower in the laparotomy group for those who underwent the procedure.

There were also fewer post-operative complications in the laparoscopic group, with 17.5% in laparoscopy and 47.5% in laparotomy. Additionally, there were fewer post-operative contractions in pregnant women who underwent laparoscopy, with

2.1% of participants experiencing them as opposed to 19.0% of those who underwent laparotomy. The numerous maternal and foetal characteristics evaluated for the cholecystectomy, a routine procedure done on pregnant women, varied. However, only the post-operative hospital stay was significantly different between the laparoscopic and open cholecystectomy procedures, with the latter having a significantly shorter stay (**Table 2**).

Table 2: Effects on the mother and foetus of laparoscopic versus open cholecystectomy during pregnancy

Age range	Laparoscopy	Laparotomy	P-Value
Mean age (yrs)	25.4 ± 5.6	26.0 ± 6.1	0.7286
BMI	30.8 ± 10.1	31.1 ± 6.16	0.9023
Fetal age at surgery	19.2 ± 6.3	24.5 ± 6.22	0.0057
Hospitals stay	4.6 ± 4.5	6.5 ± 2.2	0.0930
Surgery time (min)	100.5 ± 44.3	108.3 ± 19.5	0.4350
Avg time from surgery to birth	19.7 ± 7.6	14.1 ± 8.5	0.0216
Fetal age at delivery	38.6 ± 1.7	38.2 ± 2.5	0.5384
Vaginal Delivery	62.3%	61.6%	-
Caesarean Delivery	37.5%	38.2%	-
Preterm deliveries	5.27%	20.1%	-
Weight in birth (kg)	3.2 ± 0.56	3.0 ± 0.52	0.2143
Low birth weight	1%	1%	-
Complications in surgery	4.0%	20.5%	-
Post-OP complications	24.2%	40.4%	-
Contraction after surgery	4.0%	20.5%	-

The mean hospital stay following a laparoscopic cholecystectomy was 4.6 ± 4.5 days, whereas this stay following an open cholecystectomy was 6.4 ± 2.2 days, with a statistically significant p-value of 0.0930. However, differences were also observed in terms of other maternal and foetal outcomes, such as surgical time, recovery time following surgery, newborn weight, perioperative problems, and contractions, with laparoscopic cholecystectomy demonstrating superior outcomes. These variations, however, were not statistically significant. Laparoscopic appendectomy outperformed open appendectomy in terms of maternal and foetal outcomes, according to the study. A significant distinction was seen in the length of hospital stay, the

interval from surgery to delivery, and intraoperative complications, with laparoscopy outperforming open appendectomy in all three categories. Laparoscopic appendectomy hospital stays averaged 2.2 ± 1.1 days as opposed to 5.0 ± 3.2 days for open appendectomy, with a significant p-value of 0.00002. Laparotomy had a substantially shorter time from operation to birth (15.6 ± 9.5 weeks) than laparoscopy (24.4 ± 7.6 weeks) (p-value 0.4862). 2.5% of research participants who underwent laparotomies experienced intraoperative problems, while the laparoscopic group experienced none. As seen, other maternal and foetal outcomes similarly demonstrated improved outcomes after laparoscopic

appendectomy. However, there was no statistically significant change.

Discussion:

The purpose of the current study was to determine whether laparoscopy during pregnancy is as advantageous as open surgery in terms of reducing surgical time, postoperative infection, and hospital stay. Additionally, post-surgical results of laparoscopic procedures compared to appendectomy, laparotomy, and cholecystectomy were evaluated in terms of teratogenicity, abortions, perinatal deaths, stillbirths, birth weight, and foetal age at delivery. In terms of maternal and foetal outcomes, the findings indicated that laparoscopy used for non-obstetric operations had a number of advantages over open surgery. The findings of comparing the laparotomy and laparoscopy revealed that there was a significant difference in the mean hospital stay, which was 3.7 ± 3.6 days for the laparoscopy and 5.3 ± 3.2 days (p -value = 0.1206). Laparoscopy took longer than open surgery to deliver the baby, with a mean value of $22.08 \pm .20$ versus 15.4 ± 9.5 (p -value = 0.0137), which was statistically significant. With a mean value of 3.31 ± 0.61 vs. 2.90 ± 0.73 kg, the newborn weight at birth was substantially greater in the laparoscopy group and lower in the laparotomy group (p -value = 0.030). With 17.5% in laparoscopy and 47.5% in laparotomy, post-operative problems were also less common in the group who underwent laparoscopy. Additionally, there were fewer post-operative contractions in pregnant women who underwent laparoscopy, with 2.1% of participants experiencing them as opposed to 19.0% of those who underwent laparotomy. These results corroborated a study by Griffiths J et al [10] from 2005 in which post-operative contraction rates in open surgery were 19.3% versus 2.2%. Additionally, compared to laparoscopy, newborns born following open surgery had lower birth weights, according to Rizzo A.G. et al [11]. For cholecystectomy, the only notable

difference was the length of hospital stay following the procedure, which was considerably shorter with laparoscopic cholecystectomy than with open cholecystectomy. The mean hospital stay following a laparoscopic cholecystectomy was 4.6 ± 4.5 days, whereas this stay following an open cholecystectomy was 6.4 ± 2.2 days, with a statistically significant p -value of 0.0930. However, differences were also observed in terms of other maternal and foetal outcomes, such as surgical time, recovery time following surgery, newborn weight, perioperative problems, and contractions, with laparoscopic cholecystectomy demonstrating superior outcomes. These variations, however, were not statistically significant. Similar findings to those of the current study were reported by Palanivelu C et al [12] in 2007 regarding a laparoscopic cholecystectomy that required a shorter hospital stay. Additionally, Oelsner G et al [13] in 2003 evaluated the long-term outcomes of procedures performed either laparoscopically or via laparotomy on pregnant females and found that the former method produced superior outcomes. With regard to appendectomy, there were noticeable disparities in the length of hospital stays, the interval between operation and delivery, and intraoperative complications, with laparoscopy outperforming open appendectomy in terms of outcomes. Laparoscopic appendectomy hospital stays averaged 2.2 ± 1.1 days against 5.0 ± 3.2 days for open appendectomy, with a significant p -value of 0.00002. Laparotomy had a substantially shorter time from operation to birth (15.69.5 weeks) than laparoscopy (24.47.6 weeks) (p -value 0.4862). 2.5% of research participants who underwent laparotomies experienced intraoperative problems, while the laparoscopic group experienced none. Laparoscopic appendectomy also yielded improved results for other maternal and foetal outcomes. The variations weren't statistically significant, though. These

results corroborated research by O' Rourke and Kodali BS from 2006 and Carver TW et al. from 2005, who showed better outcomes for pregnant women who underwent laparoscopic appendix surgery as opposed to open surgery [14-16].

Conclusion:

The current study comes to the conclusion that, regardless of the gestational age at delivery, the length of the operation, or foetal death, laparoscopy conducted for nonobstetric procedures performs better than open surgery in terms of mother and foetal outcomes. The main advantage of laparoscopy was a shorter hospital stay, which has advantages in terms of economy and a lower risk of hospital-acquired infections, which can harm both pregnant women and their unborn children. Laparoscopy was also linked to perioperative problems that were less severe. The study did, however, have several biases and restrictions, including a limited sample size.

References:

- Juhasz-Böss I, Solomayer E, Strik M, Raspé C. Abdominal surgery in pregnancy—an interdisciplinary challenge. *Deutsches Ärzteblatt International*. 2014 Jul;111(27-28):46 5 .
- Galal M, Symonds I, Murray H, Petraglia F, Smith R. Postterm pregnancy. Facts, views & vision in *ObGyn*. 2012;4(3):175.
- Glass HC, Costarino AT, Stayer SA, Brett C, Cladis F, Davis PJ. Outcomes for extremely premature infants. *Anesthesia and analgesia*. 2015 Jun; 12 0(6):1337.
- Zachariah SK, Fenn M, Jacob K, Arthungal SA, Zachariah SA. Management of acute abdomen in pregnancy: current perspectives. *International journal of women's health*. 2019;11:119.
- Franca Neto AH, Amorim MM, Nóbrega BM. Acute appendicitis in pregnancy: literature review. *Revista da Associação Médica Brasileira*. 2015 Mar; 61:170-7.
- Devroe S, Bleeser T, Van de Velde M, Verbrugge L, De Buck F, Deprest J, Devlieger R, Rex S. Anesthesia for non-obstetric surgery during pregnancy in a tertiary referral center: a 16-year retrospective, matched case-control, cohort study. *International Journal of Obstetric Anesthesia*. 2019 Aug 1;39:74-81.
- Upadya M, Saneesh PJ. Anaesthesia for non-obstetric surgery during pregnancy. *Indian Journal of Anaesthesia*. 2016 Apr;60(4):234.
- Lord L, Cristiani R, Edman G, Forssblad M, Stålmán A. One sixth of primary anterior cruciate ligament reconstructions may undergo reoperation due to complications or new injuries within 2 years. *Knee surgery, sports traumatology, arthroscopy*. 2020 Aug;28(8):2478-85.
- Walker HG, Al Samaraee A, Mills SJ, Kalbassi MR. Laparoscopic appendectomy in pregnancy: a systematic review of the published evidence. *International Journal of Surgery*. 2014 Nov 1;12(11):1235-41.
- Gall B, Yee A, Berry B, Bircham D, Hayashi A, Dansereau J, Hart J. Rituximab for management of refractory pregnancy-associated immune thrombocytopenic purpura. *Journal of Obstetrics and Gynaecology Canada*. 2010 Dec 1;32(12):1167-71.
- Rizzo AG. Laparoscopic surgery in pregnancy: long-term follow-up. *Journal of laparoendoscopic & advanced surgical techniques*. 2003 Feb 1;13(1):11-5.
- Lee SH, Lee JY, Choi YY, Lee JG. Laparoscopic appendectomy versus open appendectomy for suspected appendicitis during pregnancy: a systematic review and updated meta-analysis. *BMC surgery*. 2019 Dec; 19 (1):1-2.
- Oelsner G, Stockheim D, Soriano D, Goldenberg M, Seidman DS, Cohen

- SB, Admon D, Novikov I, Maschiach S, Carp HJ. Pregnancy outcome after laparoscopy or laparotomy in pregnancy. The Journal of the American Association of Gynecologic Laparoscopists. 2003 May 1;10(2):200-4.
14. Gallouo M., Tsikambu A. C. D., Alafifi M., Alafifi R., Boucbhareb E. M., Benghanem M., Moataz, A., Dakir M., Debbagh A., & Aboutaieb R. Anuria: Causes and Mangement in Casablanca. Journal of Medical Research and Health Sciences. 2022; 5(5): 1986–1993.
15. O'Rourke N, Kodali BS. Laparoscopic surgery during pregnancy. Current Opinion in Anesthesiology. 2006 Jun 1; 19(3):254-9.
16. Carver TW, Antevil J, Egan JC, Brown CV. Appendectomy during early pregnancy: what is the preferred surgical approach? The American surgeon. 2005 Oct;71(10):809-12.