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Original article

Effects of Closure Versus Non-Closure of The Visceral and Parietal Peritoneum at Cesarean Section

Wagdy M. Amer, Ashraf I. El-Mashad, Esraa M. Abdel-Moaty, Yehia S. Edriss

Obstetrics and Gynecology Department, Faculty of Medicine Benha University, Egypt.

Corresponding to:
Dr. Esraa M. Abdel-Moaty. Obstetrics and Gynecology Department, Faculty of Medicine Benha University, Egypt.

Email:
esrss.mohamedsoliman90@gmail.com

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Abstract:

Background: Globally, caesarean sections (CS) are on the rise. It is among the most frequently performed major obstetric surgeries. This study aimed to evaluate the outcomes of closure versus non-closure of the visceral and parietal peritoneum. **Methods:** This randomized blinded controlled clinical trial was carried out on 400 consenting women undergoing CS. All pregnant women were randomized into one of the four equal groups: Group 1: Closure of parietal peritoneum only, group 2: Closure of visceral and parietal peritoneums, group 3: No closure of peritoneums, and group 4: Closure of the visceral peritoneum only **Results:** Surgery duration was considerably lower in Group 3 which was 25 min in average while group 2 showed the longer Duration of Surgery 34 min in average ($p<0.001$). There was a considerably significant difference between 4 groups according to post-operative patients' satisfaction VAS ($p=0.04$), and Analgesics used (Pethidine 10mg/ml) as the lowest amount was in group 3 (1.83 ml) and the highest amount was in group 2 (2.31 ml) ($p<0.0001$). **Conclusion**: For visceral and parietal peritoneum in CS, the non-closure approach is recommended due to its much shorter operating time and lower postoperative pain score. As a result of these advantages, it may be preferred as a method of treating CS patients.

Keywords: Closure; Non-Closure; Visceral; Parietal Peritoneum; Cesarean Section

Introduction

Globally, caesarean sections (CS) are on the rise. It is among the most frequently performed major obstetric surgeries. Consequently, any intervention aimed at minimizing the morbidities associated with surgery will contribute greatly to the improvement of women's health (1).

CS is an intricate technique. Proper tissue manipulation, adequate hemostasis, the avoidance of tissue ischemia, and infection control are essential for wound healing and the prevention of adhesion development in the future. Throughout the length of the surgery, each phase or tissue layer is treated with a unique surgical method. Numerous elements impact a surgeon's approach choice. As with other aspects of medical practice, these judgments must be supported by evidence (2).

Despite the publishing of several studies on the subject, there is no consensus about the best c-section approach. Mesothelial cells and connective tissue constitute the peritoneal membrane. The parietal membrane protects the abdominopelvic cavity, while the visceral peritoneum covers the outer surface of the visceral organs (3).

In order to reach the uterine surface during CS, these membranes must be incised in order to get access to the uterus. The majority of surgeons prefer to shut these membranes prior to the conclusion of therapy, as they feel it may increase wound strength (4).

Some surgeons do not routinely close these membranes because they feel doing so would increase expenses, operation duration, and postoperative pain (5).

Cochrane research shown that not sealing peritoneal membranes lowers surgical time and postoperative recovery time; nonetheless, the authors stressed the need for information about the long-term implications of this comparison (3).

There is evidence that, if the peritoneum is not sutured, a peritoneal defect will have mesothelial integrity within 48 hours and no fibrosis or scarring within five days. It was associated with a quicker recovery. The absence of suture materials and less tissue manipulation are hypothesized to reduce adhesion formation. However, there are no data on the effect of peritoneal closure on vital sign changes generated by peritoneal stretching (6).

This study aimed to evaluate the outcomes of closure versus non-closure of the visceral and parietal peritoneum, to compare the postoperative movement of both techniques.

Patients and methods

This randomized blinded controlled trial was conducted on 400 consenting women undergoing cesarean section in Benha university hospitals from February 2021 to Augustus 2022. The study was conducted

after being approved by the research ethical committee and informed consent was obtained from all participants included.

Inclusion criteria were pregnant women planned for elective CS under spinal or general anesthesia and term singleton pregnancies.

Exclusion criteria were *e*mergency CS, maternal diseases (preeclampsia, diabetes mellitus, coagulation disorders, chronic renal disorders, psychiatric disorders), PROM, Chorioamnionitis, placental invasion anomalies, multiple pregnancies and history of previous C-section ≥ 2

Sample size:

Difference between the means, OpenEpi, Version 3, the open-source calculator-SSMean, may be printed from the browser with ctrl-P or copied and pasted into other apps. Using version 2002 of the World Health Organization and Centers for Disease Control and Prevention's statistical tool Epi-Info, the sample size was estimated. The criteria used for sample size calculation were as follows: 95 percent limit of confidence and 80 percent research power. Based on the previous criterion, the sample size for each group was found to be at least 100 pregnant women.

Study groups: Using computer-generated random numbers, pregnant women were divided into four unique groups (100 each). A blind head nurse who was not engaged in the research or data collection administered the allocation using a sealed, opaque envelope. When the box is opened, each pregnant woman's group assignment was revealed.

Women were randomly allocated into four equal groups: Group 1: Parietal peritoneum closure alone; Group 2: Closure of visceral and parietal peritoneums; Group 3: No peritoneum closure; and Group 4: Visceral peritoneum closure only.

All women were subjected to: Detailed history taking including parity, previous sections or abdominal surgery. Clinical examination: A- General examination including Vital signs: pulse, blood pressure, capillary filling time, respiratory rate and temperature, before and after the operation. B- Systemic examination including Cardiovascular, respiratory, GIT and neurological assessment. Investigations: All pregnant women were subjected to preoperative routine investigations as: Complete blood count, pre and post-operative, PT, PTT and INR, random blood sugar, kidney function tests, liver function tests and urine analysis.

Details of cesarean section (CS), including indication of CS, Presence of adhesions, Estimated blood loss (ml), Duration of surgery (minutes), and Urine output.

Techniques: All surgical operations were carried out under either spinal or general anesthesia. In every operation, a standard

protocol was adhered to. Each lady had a transverse incision made (Pfannenstiel type). Two to three centimeters above the pubic symphysis, the Pfannenstiel skin incision is curved and placed at an angle.

Scalpels were used for accurate dissection during CS. Following fingertip dissection of the subcutaneous tissue layer, a tiny transverse incision was made medially with a knife and enlarged laterally with scissors in the fascial layer. The rectus muscles were roughly divided. We opened the peritoneum with our fingers.

We used a blade to cut the visceral peritoneum, generated a bladder flap, and made a low transverse uterine incision. Following the removal of the fetus and placenta, the uterus was exteriorized and the uterine incision was closed using a two-layer Vicryl 1.0 continuous locking suture (Ethicon Johnson &Johnson, Mumbai, India) (Ethicon Johnson &Johnson, Mumbai, India). Blood and foetal material, such as amniotic fluid, were evacuated from the intraabdominal cavity.

In line with the randomization, the visceral or parietal peritoneum was either closed with Vicryl 2.0 suture (Ethicon Johnson &Johnson, Mumbai, India) or left open. We did not sew or connect the rectus abdominis muscles in any other way. The fascial layer was closed with sutures that were continuous and loose. The sutures were placed around 1 cm from the incision's edge and 1 cm apart without excessive tension. Before the thickness of the tissue reached 2 cm, the subcutaneous fat was not sealed.

The skin was reattached using a subcuticular Vicryl 2.0 suture that was continuous (Ethicon Johnson &Johnson, Mumbai, India). All surgical procedures were performed by medical students in their third year of study. As day zero, the day of the caesarean section was regarded. In addition to all postoperative procedures, all experts (nurses and researchers) and participants in the study were blinded to the study groups.

For the first twenty-four hours, standard intravenous paracetamol (1 g per eight hours) was administered, followed by three oral dosages each day. During surgery, prophylactic intravenous antibiotics were administered to all patients (Cefazolin 1 g). When gastrointestinal sounds were heard, oral nourishment was administered. The mother's blood pressure and pulse rate were monitored and documented by the staff.

Outcome: Vital signs: In the first twenty-four hours after surgery, blood pressure, pulse rate, and urine output are monitored hourly. Time interval to return of bowel sound: The time between the start of surgery and the detection of the first bowel sound. Duration of hospital stay: The period from the beginning of operation (0 h) and hospital release. Pregnant women' satisfaction: On a visual analogue scale (VAS) ranging from 0 to 100, participants were asked to score their

hospital progress and satisfaction with the study's methodology. The happiness VAS consists of a 100mm long horizontal line. At the beginning and conclusion of the passage, two adjectives denoting immense joy were utilized (i.e., no satisfaction and extreme satisfaction). The patient's degree of satisfaction was expressed by a vertical mark on the 100mm line. The millimeter measurement was converted into the same number of points ranging from 0 to 100. The exact question was, "Are you satisfied with the time it took you to begin oral feeding following surgery?" Below the VAS horizontal line was the standard VAS form completion instruction (6). Pain category: rated as 0–4 for no pain, 5–44 for mild pain, 45–74 for moderate pain, and 75–100 for severe pain. In the postoperative obstetric ward, pain was assessed immediately (0 h), 6 h, and 24 h after the patient's arrival in the recovery area.

In addition: All participants were asked how happy they were with the pain therapy after 24 hours. All analgesics administered during the first twenty-four hours after surgery were recorded, including the time of administration, the name of the painkiller, and the physician.

Statistical analysis

The acquired data were inspected, processed, tabulated, and uploaded to a computer using the Statistical Package for the Social Sciences (Version 25.0. Armonk, NY: IBM Corp.). According to the kind of data gathered for each parameter, the provided data were examined. The Kolmogorov-Smerinov test was conducted to determine if the data's distribution was normal. SD and range for parametric numeric data; median and range for nonparametric data, Quantitative data frequency and proportion, Student T Test was used to determine the statistical significance of the difference between the two research groups' means. The statistical significance of the difference between two non-parametric groups using the Mann-Whitney U-test, was examined. The statistical significance of the difference between three or more non-parametric study group variables was examined using the Kruskal-Wallis test. The Chi-Square test is used to assess the relationship between two qualitative variables. Fisher's exact test was used to assess the relationship between two qualitative variables. It was regarded statistically significant at P-value < 0.05.

Research ethics committee: Ms.10.2.2021

Results

The mean age of all cases was 25.94 and mean parity was 1.33 while mean Previous sections was 1.10. 123 (30.75%) of cases showed Presence of adhesions from previous CS

Indication of CS in all studied cases was Breech presentation in 138 (34.5%) of cases,

PROM in 46 (11.5%) of **cases**, Oligohydraminos in 76 (19%) of cases, Elderly primigravida in 46 (11.5%) of cases, CPD in 38 (9.5%) of cases, Primary infertility/precious baby in 46 (11.5%) of cases and Prolonged labor in 10 (2.5%) of cases (Figure 1).

The mean of post-operative pulse was 97.69 ppm and mean of post-operative mean blood pressure was 90.48 mmHg while mean post-operative temperature was 37.33°. The mean time required to return bowel sound was 23.37 min. According to pain Category in all studied cases after 6 hours of surgery, 138 (34.5%) of patients were with mild pain while 167 (41.75%) of patients had moderate pain and 95 (23.75%) of patients suffered from severe pain. According to post-operative pain control and satisfaction in all studied groups, the mean of Patients' satisfaction VAS was 57.02, the mean Duration of hospital stay was 1.10 day (Table 1).

There was no SSD between the 4 groups according to preoperative vital signs pulse (p= 0.91), Blood pressure (p= 0.95) and Temperature (p= 0.78). (Figure 2)

There was no SSD between the 4 groups according to estimated blood loss. While Duration of Surgery was statistically significant lower in Group 3 which was 25 min in average while group 2 showed the longer Duration of Surgery 34 min in average (p<0.001) (Table 2)

Table 1: Post-operative vital signs and post-operative pain control and satisfaction in all studied groups

Post-operative Vital signs	Minimum	Maximum	Mean	Std. Deviation
Post-operative pulse	85.00	110.00	97.69	5.64
Post-operative mean blood pressure (mmHg)	80.00	105.00	90.48	5.45
Post-operative temperature (ºC)	36.50	38.50	37.33	0.38
Time to return bowel sound (hrs)	15.00	35.00	23.37	5.21
Post-operative pain control and satisfaction				
Patients' satisfaction VAS	40.00	80.00	57.02	13.50
Duration of hospital stay (Days)	1.00	2.00	1.10	0.30

Table 2: Comparison between four groups according to operative data

	Group 1 (n=100)	Group 2 (n=100)	Group 3 (n=100)	Group 4 (n=100)	ANOVA	p
Estimated blood loss (ml)	434.62	428.57	416.67	438.46	0.21	0.89
Duration of Surgery (mins)	30.00	34.29	25.00	27.31	6.19	<0.0001*

P <0.0001 is highly statistically significant

There was no SSD between the 4 groups according to post-operative pulse. While post-operative mean blood pressure was highly statistically significant lower in Group 3 which was 87.50 mmHg in average ($p<0.0001$) and also post-operative temperature was statistically significant lower in Group 3 which was 37.21° in average ($p<0.001$) (Figure 3).

There was a SSD between 4 groups according to post-operative patients' satisfaction VAS ($p=0.04$) (Table 3)

There was a SSD between 4 groups according to pain category as group 3 associated with the best Pain category and patients' satisfaction among all groups. 61 (61%) of patients in group 3 showed mild pain while only 7(7%) patients in group 2 showed mild pain (Table 4).

Table 3: Comparison between four groups according to post-operative pain control and satisfaction

group	Group 1 (n=100)	Group 2 (n=100)	Group 3 (n=100)	Group 4 (n=100)	ANOVA	p
patients' satisfaction VAS	52.69	64.21	50.33	54.77	2.99	0.04
Duration of hospital stay (days)	1.08	1.14	1.08	1.08	0.15	0.93

Table 4: Comparison between four groups according to Pain category

	Group 1 (n=100)	Group 2 (n=100)	Group 3 (n=100)	Group 4 (n=100)	Total	X^2	P
Mild pain	32	7	61	38	138	108.617	<0.001
Moderate pain	61	45	15	46	167		
Severe pain	7	48	24	16	95		

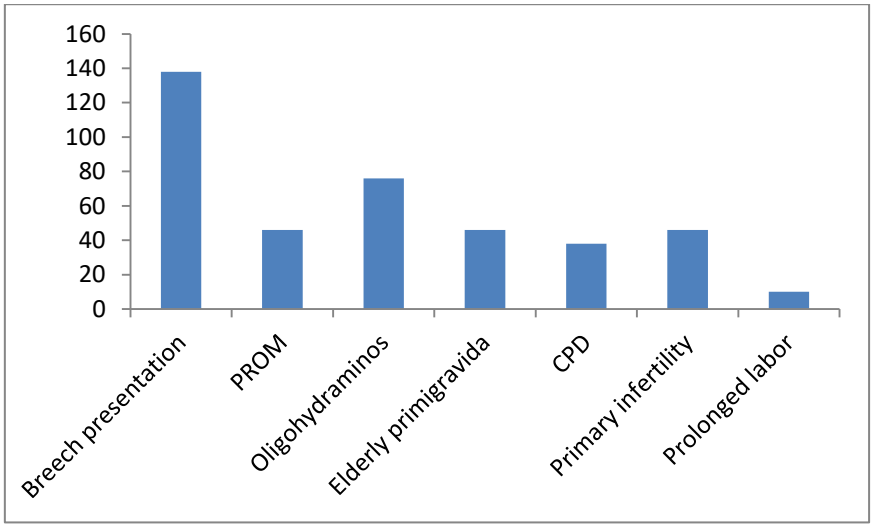

Figure 1: Indication of CS in all studied group.

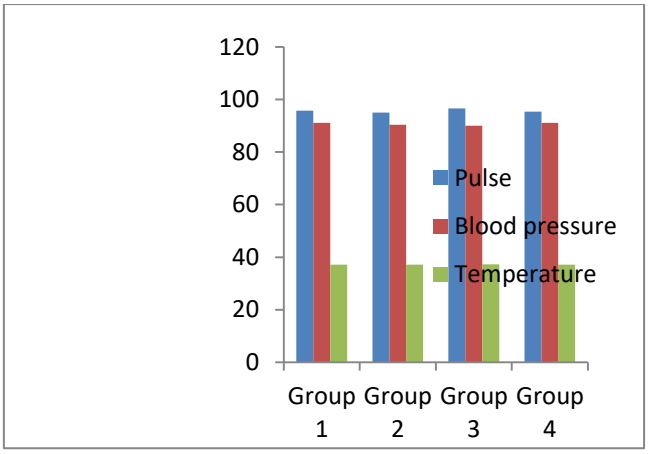

Figure 2: Comparison between four groups according to preoperative vital signs

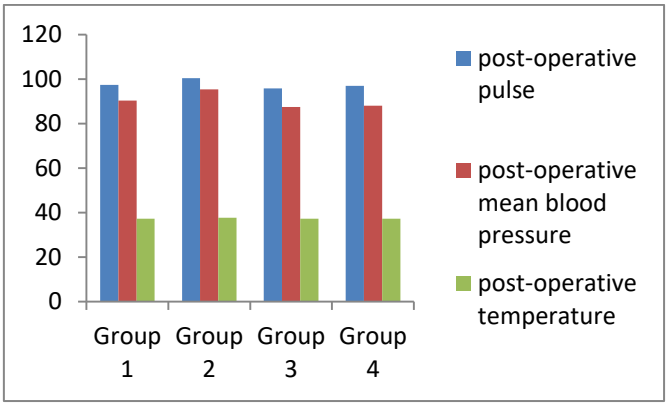

Figure 3: Comparison between four groups.

Discussion

Depending on the institution analyzed and the location involved, caesarean section (CS) is one of the most frequent surgical procedures performed worldwide, accounting for up to 70% of births. Approximately 5 to 20% of all births globally occur in underdeveloped countries (7).

Indication of CS in all studied cases was Breech presentation in 138 (34.5%) of cases, PROM in 46 (11.5%) of cases, Oligohydraminos in 76 (19%) of cases, Elderly primigravida in 46 (11.5%) of cases, CPD in 38 (9.5%) of cases, Primary infertility/ precious baby in 46 (11.5%) of cases and Prolonged labor in 10 (2.5%) of cases. According to Vital signs in all studied cases, mean pulse was 95.67 ppm and mean of mean blood pressure was 90.67 mmHg while mean Temperature was 37.13°. According to lab analysis in all studied cases, it was within normal range for Hb, WBCs, PLT, INR, Random

Blood sugar, urea and creatinine. The mean of Estimated blood loss in all studied cases was 429.81 ml and mean Duration of Surgery was 29.33 min. 123 (30.75%) of cases showed Presence of adhesions from previous CS.

A study conducted in 2002 (8) revealed that the non-closure group had 6 minutes less operational time than the closure group, a study (3) stated a decrease in operational time (7.33 minutes) among women who had both peritoneal surfaces left unsutured as opposed to those who had their peritoneum sutured, a study (9) revealed that the operating time of the non-closure group was shorter (11.2 minutes) than that of the closure group and in the study conducted in 2012 (5) the non-closure group had a shorter operating time (6.89 minutes) than the closure group.

The mean of post-operative pulse was 97.69 ppm and mean of post-operative mean blood pressure was 90.48 mmHg while mean post-operative temperature was 37.33°C. The mean time required to return bowel sound was 23.37 min. According to post-operative pain control and satisfaction in all studied cases, the mean of Patients' satisfaction VAS was 57.02 and average amount of Analgesics used (Pethidine 10mg/ ml) was 2.29 ml. mean Duration of hospital stay was 1.10 day. According to pain Category in all studied cases after 6 hours of surgery, 138 (34.5%) of patients were with mild pain while 167 (41.75%) of patients was with moderate pain and 95 (23.75%) of patients suffered from severe pain.

According to main properties, this analysis found no SSD s between the four groups. There was no statistically significant variation in preoperative vital indicators between the four groups. Testing in the laboratory found no SSD s between the four groups. In the present study, there was no SSD between 4 groups according to Estimated blood loss. While Duration of Surgery was significantly lower in Group 3 which was 25 min in average while group 2 showed the longer Duration of Surgery 34 min in average ($p<0.001$). The decrease in operating time lowered the duration of anesthetic exposure and wound exposure to environmental contaminants. This is shown by a reduction in the frequency of febrile morbidity.

Regarding post-operative pulse, our study found no SSD s among the four groups. While post-operative mean blood pressure was significantly lower in Group 3 which was 87.50 mmHg in average ($p<0.001$) and also post-operative temperature was significantly lower in Group 3 which was 37.21° in average ($p<0.001$). Regarding post-operative patient satisfaction, there was a SSD between four groups VAS ($p=0.04$), and Analgesics used (Pethidine 10mg/ ml) as the lowest amount was in

group 3 (1.83 ml) and the highest amount was in group 2 (2.31 ml) ($p<0.001$)

An interventional study reported (10) that the majority of women in the non-closure group restored normal bowel function, ambulated, and started nursing sooner than their counterparts in the closure group. The closure of the peritoneum enhanced discomfort, nausea, and vomiting. This was also more cost-effective, since hospital stays for women with peritoneal non-closure were shorter and less suture material was used.

In contrast, a recent study in 2021 (7), there was no SSD regarding the pain degree and the analgesia requirements. In a study in 2013 (11) due to adhesions caused by non-closure of the peritoneum during primary CS, the non-closure group had more postoperative discomfort. However, our study lacks the context of past CS techniques.

There was a SSD between 4 groups according to Pain category as group 3 associated with the best Pain category and patients' satisfaction among all groups. 61 (61%) of patients in group 3 showed mild pain while only 7(7%) patients in group 2 showed mild pain.

Other study supports our finding that non-closure of the visceral and parietal peritoneum is related to an improvement in the short-term postoperative prognosis (5). Comparing the postoperative morbidity of the approaches with the contradictory evidence about the results of parietal peritoneum closure vs non-closure after CS, therefore, non-closure of visceral and parietal peritoneum may be the treatment of choice for individuals with CS.

Conclusion

For visceral and parietal peritoneum in CS, the non-closure approach is recommended due to its much shorter operating time and lower postoperative pain score. As a result of these advantages, it may be preferred as a method of treating CS patients.

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