

Comparison between the Effect of Rectus Muscle and Peritoneum Closure Versus Non-closure in Repeated Caesarean Section on Postoperative Pain: A Randomized Controlled Trial

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Abstract

Aim: To compare the effect of rectus muscle and peritoneum closure versus non closure during repeated Cesarean Section on postoperative pain. **Study Design:** A prospective, single-blinded, randomized clinical trial. **Patients and Methods:** It included 100 patients, who, underwent repeated Cesarean section. They were randomly allocated into two groups; group A & B with non-closure & closure of rectus muscle and peritoneum respectively. Postoperative pain was assessed by visual analogue scale during hospital stay. Postoperative analgesia, amount of blood loss and occurrence of postoperative complications were also analyzed. **Results:** Women with non-closure technique had significantly lower visual analogue score (VAS) at the end of 1st 48 hours postoperative (2.86 ± 1.61) in comparison to other group. Women who underwent closure had no difference as regard VAS (4.26 ± 2.19 vs. 4.80 ± 2.36 ; p value = 0.19). Regarding postoperative

analgesia intake, women with non-closure had a significant lower intake of analgesic drugs (170.76 ± 30.85 mg) in comparison to the other group. **Conclusion:** Rectus muscle and peritoneal approximation is associated with significant increase in postoperative pain and analgesia.

Key Words: Cesarean section; postoperative analgesia; postoperative pain; rectus muscle closure

Introduction

Cesarean section (CS) deliveries have shown a dramatic increase worldwide ^[1]. According to Demographic and Health survey, 52% of women, in Egypt, had delivered by CS^[2] in 2014. There is still conflict about the best surgical technique for CS^[3].

One of the main targets in CS is to reduce postoperative adhesions. Leaving an opened intraperitoneal cavity in direct contact with the rectus sheath as it is an important factor in causing postoperative adhesions, directing obstetricians to use various surgical techniques, such as parietal peritoneal closure and rectus muscle closure ^[4]. Furthermore, rectus muscle approximation has been considered to decrease the possibility of divarication of recti^[5]. There is a great controversy about rectus muscle and peritoneal closure effect on post operative adhesion . One theory states that the rectus muscles will eventually return to their anatomical position without approximation. Another theory linked their closure to increase post operative pain. This study was carried out to study the effect of closure of rectus muscle and peritoneum on post operative pain^[6].

Patients and methods

This study was a prospective, single-blinded, randomized controlled trial that conducted at Benha University Hospitals from May 2022 to November 2022, to study the effect of rectus muscle and peritoneal closure on postoperative pain. This trial was approved by the ethical committee of Faculty of Medicine, Benha University (IRB no: Rc 12-11-2022). We recruited 100 participants in this study. They all had a previous cs; they aged from 18 to 35 years, with single term pregnancy. They were divided into 2 groups non closure group (A) and closure group (B). Each group included 50 participants. We excluded multiple pregnancies, women with any medical or psychiatric disease and participants giving history of chronic use of analgesia or any allergy to analgesics were excluded all operations were done by senior consultants following the same surgical techniques.

Randomization

Randomization was done rigorously and transparently using computer-generated random numbers. To ensure unbiased allocation of participants to the study arms, the allocation sequence was concealed from the study investigators. Envelopes

containing the allocation data were selected sequentially by the patient herself in presence of the study nurse.

Intervention

One gram of cefazoline (cefazoline, Sandoz, Holzkirchen, Upper Bavaria, Germany) was administered intravenous to all women prior to skin incision as a prophylactic antibiotic. Pfannenstiel skin incision was performed. Then fascia was dissected off the rectus muscles followed by separating the muscles in midline. Transverse lower uterine segment incision was performed to deliver fetus. Placental removal was carried out followed by closure of the uterus in two continuous layers with polyglactin 1 suture (Vicryl 1, Somerville, NJ, USA) without exteriorization.

In group A, the rectus muscle and peritoneum left without closure, while in group B, the muscle and peritoneum were closed by vertical mattress or simple interrupted loose sutures. Continuous Vicryl 1 sutures were used for suturing the rectus sheath followed by interrupted sutures for closing the subcutaneous layer. Finally, skin was sutured in subcuticular manner using prolene 3/0 suture.

Primary outcome was post-operative pain assessment. We used Visual analogue scale

(VAS) to measure the intensity of pain [8]. The patients were informed to mark along a 10 cm line. The VAS scales were demonstrated for pain (0=no pain; 10= worst pain). We assessed the VAS for 48 hours postoperative.

We standardized intraoperative analgesia protocol by using spinal anesthesia using 12 mg bupivacaine (Heavy Marcaine Spinal 0.5%, AstraZeneca, Cambridge, United Kingdom). The postoperative pain was treated by intramuscular Ketolac amp (Ketolac Tromethamine 30 mg/2ml) during hospital stay (48 hours postoperative). We informed all patients to ask for further analgesia once the pain recurred. We recorded total analgesic administration postoperative. Wound infection and mean amount of intraoperative blood loss were reported as secondary outcomes of the present study.

Sample size calculation

The sample size was calculated using G*power software version 3.1.9.2 based on an expected medium effect size of the amount of analgesia needed ($d = 0.5$) [7]. The total sample size calculated was 100 patients (50 in each group). Alpha and power were adjusted at 0.05 and 0.8, respectively.

Statistical analysis

Data were collected and analyzed by using SPSS (Statistical Package for the Social Science, version 20, IBM, and Armonk, New York). Continuous data were expressed as mean \pm SD while nominal data were expressed as frequency (percentage). Chi²-test was used to compare the nominal data of different groups while continuous data of two groups were compared with the ANOVA test followed by post-analysis. The level of confidence was kept at 95% and hence, the *p* value was considered significant if < 0.05 .

Results

Age and gestational age among enrolled groups

Details of baseline characteristics are shown in table 1. There was no significant difference between studied groups regarding age and gestational age ($p > 0.05$). Mean age in group A was 23.88 ± 5.68 years with mean gestational age 38.52 ± 1.19 week. Mean age of women group B was 24.32 ± 5.42 years with mean gestational age 38.68 ± 1.09 weeks (Table, 1).

Visual analogue score at the end of 1st 48 hours after CS among studied groups

Women with non-closure technique had significantly lower visual analogue score (VAS) after 48 hours postoperative (2.86 ± 1.61 ; p value < 0.001) in comparison to the other group. Women who had closure either showed no significant difference as regard VAS (4.26 ± 2.19 vs. 4.80 ± 2.36 respectively; $p = 0.19$) as demonstrated in (Table 1, and figure 1).

Postoperative among enrolled groups

Participants in group A reported significant decreased intake of nonsteroidal anti-inflammatory drugs (NSAIDs) dose (170.76 ± 30.85 mg) in comparison to other groups. Group B revealed no difference in postoperative analgesia administration (227.50 ± 50.52 vs. 237.11 ± 56.19 (mg) respectively; p value $= 0.30$) as shown in (Table 1, and figure 2).

Intraoperative blood loss and wound infection

Intraoperative blood loss reported no significant differences among the different groups. As regards to wound infection, 2 cases had wound infection in studied groups (group A=1, group B=1)

Table 1: Comparison of demographic data, visual analogue score, postoperative analgesia, amount of blood loss and incidence of wound infection among enrolled groups.

	Group a	Group b	p
Age (year)	23.88 ± 5.68	24.32 ± 5.43	0.31
Gestational age (week)	38.52 ± 1.19	38.68 ± 1.09	0.23
VAS after 48 hours	2.86 ± 1.61	4.80 ± 2.36	< 0.001
Postoperative analgesia (mg)	170.76 ± 30.85	237.11 ± 56.19	< 0.001
Intraoperative blood loss (ml)	458.65 ± 75.22	464.42 ± 80.03	0.68
Wound infection	1 (1.9%)	1 (1.9%)	0.50

Data expressed as mean. *p* value was significant if < 0.05. VAS: visual analogue score. P compares between non re-approximation and re-approximation.

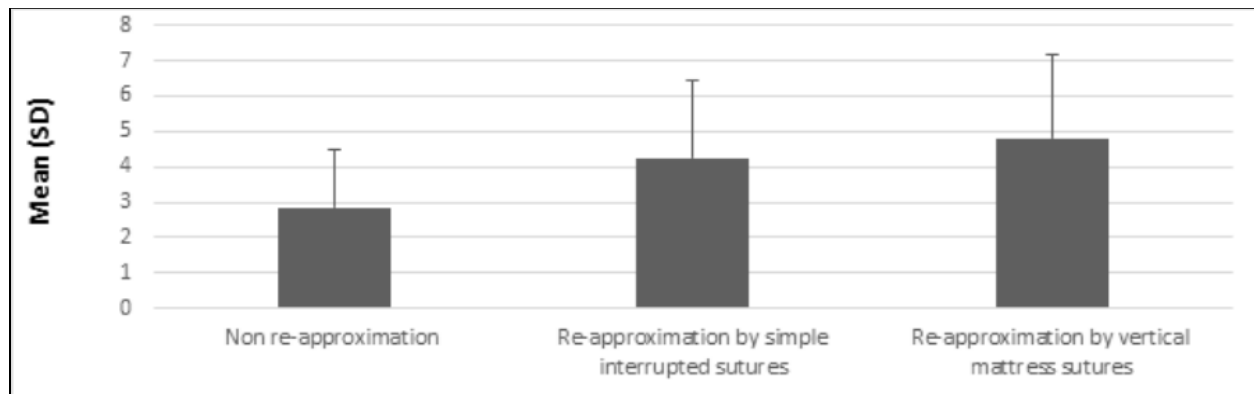


Fig. 1: Mean visual analogue at the end of 1st 48 hours postoperative among the studied groups

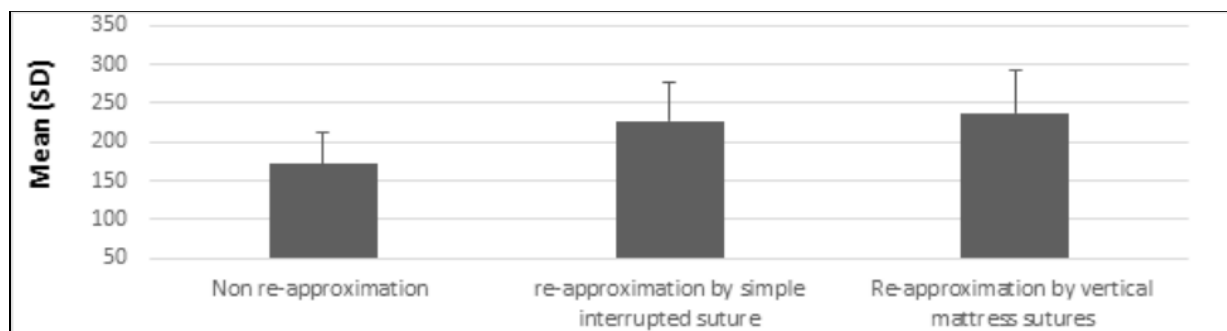


Fig. 2: Mean postoperative analgesia (NSAIDs) during 48 hours post CS of the studied groups

Discussion

This randomized trial was designed to investigate the effect of different techniques of rectus muscle approximation during CS on postoperative pain. We recruited 100 participants. All patients received the same intraoperative anesthesia, same postoperative pain management protocol, and similar surgical method. Only previous CS women with a singleton fetus were incorporated. Our study showed a significant decline in postoperative pain (48 hours follow-up) and analgesia usage (NSAIDs) in non-closure group compared to the other group of rectus muscle approximation. Rectus muscle and peritoneal closure has been widely considered to decrease postoperative adhesions ^[4-10].

However, the main concern against this step during cesarean section is possible association with increased postoperative pain. In deemed their study to be the first to evaluate the association between rectus muscle and peritoneal closure and postoperative pain in the literature from 1960 to 2016^[11]. They included 63 participants, undergoing their first cesarean section, randomized into two unequal groups; 35 patients underwent rectus muscle approximation, and 28 women had no

closure. They reported that there was an increase of movement pain and short-term postoperative opioid intake in the group undergoing rectus muscle closure ^[11]. Even though, their study was stopped after an enrollment period of 6 years and before they completed their estimated sample size.

In a prospective double-blinded study conducted by group of investigators in Cairo University in 2018, the effect of rectus muscle re-approximation on postoperative pain and analgesia uses was assessed during first two days postoperative. They examined 140 primigravids who underwent rectus muscle re-approximation and another 140 primigravids with non-approximation. They reported that rectus muscle re-approximation significantly increases postoperative pain and raises the analgesic requirements among women undergoing primary Cesarean section ^[12].

In comparison with the study of Lyell et al, we disagreed with their results of postoperative analgesia use. Lyell and co-authors found the total opioid and NSAIDS use were similar between both groups ^[11]. In line with the study performed in Cairo University, we have the same results

regarding the effect of rectus muscle re-approximation on postoperative analgesia. Regarding intraoperative blood loss, there was no significant difference among all groups. This finding is consistent with the results of the previous two studies who reported no effect of rectus muscle closure on intraoperative blood loss [11-12]. In agreement with the study of Cairo University as regards the postoperative complications, no significant differences were found among all three groups.

The main limitations of our study were its short-term follow-up and inability to evaluate possible long-term benefits as a decrease in postoperative adhesions and prevention of diastasis of recti. Therefore, a long-term follow-up should be designed to assess postoperative adhesions and divercation and to compare the potential benefits with the rise in postoperative pain and analgesia intake.

Conclusion

Different techniques of muscle re-approximation during CS will increase demands for analgesic requirements with increased pain postoperative in both techniques of re-approximation. It seems that non closure of the rectus muscle and

peritoneum at the CS has lower postoperative pain with less analgesia intake.

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