

Assessment of the Effect of Rectus Muscle Re-Approximation by Two Techniques Versus Non Re-Approximation During Caesarean Section on Postoperative Pain: A Randomized Controlled Trial

Original
Article

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ABSTRACT

Aim: To assess the effect of rectus muscle re-approximation by two different techniques during Cesarean Section on postoperative pain.

Study Design: A prospective, single-blinded, randomized clinical trial.

Patients and Methods: It included (n=156) primigravida who underwent Cesarean section. They were randomly allocated into three groups; Group (A): non-closure of rectus muscle, Group (B): re-approximation by three simple interrupted sutures, and Group (C) re-approximation by three vertical mattress sutures. Postoperative pain was assessed by visual analogue scale during hospital stay. Postoperative analgesia, amount of blood loss and occurrence of postoperative complications were also investigated.

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 groups. Women who underwent re-approximation either with simple interrupted sutures or vertical mattress sutures had no difference as regard VAS (4.26 ± 2.19 vs. 4.80 ± 2.36 ; *P value* = 0.19). Regarding to postoperative analgesia intake, women with non-re-approximation had significant lower intake of analgesic drugs (170.76 ± 30.85 mg) in comparison to other two groups. Both techniques of muscle closure showed no difference in analgesic requirements postoperative.

Conclusion: Rectus muscle approximation is associated with significant increase in postoperative pain and analgesia.

Key Words: Cesarean section, post-operative analgesia, post-operative pain, rectus muscle re-approximation.

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INTRODUCTION

Recently, Cesarean section (CS) deliveries have shown dramatic increase universally^[1]. As reported by the 2014 Demographic and Health survey there was about 52% of women, in Egypt, had delivered by CS^[2]. There is still argue about the best surgical technique of CS^[3].

The main targets of each different methods of CS is to reduce postoperative adhesions. Believing of leaving an opened intraperitoneal cavity in direct contact with the subfascial space is the important factor causing postoperative adhesions, leded obstetricians to use various surgical techniques, such as parietal peritoneal closure and rectus muscle re-approximation^[4]. Furthermore, rectus muscle approximation has been considered to decrease the possibility of diastasis of recti^[5-6]. Even though, many studies, were conducted to assess the effect of rectus muscle approximation on postoperative adhesions and diastasis recti, revealed a great controversy, among obstetricians, about rectus muscle re-approximation^[6]. On the other hand, some obstetricians think that rectus muscles

can return to their anatomical position without needing any approximation^[7]. However, there has been a concept that rectus muscle re-approximation is associated with high postoperative pain scores.

Therefore, this study was conducted to investigate the effect of rectus muscle approximation by two different suturing techniques during CS on postoperative pain.

PATIENTS AND METHODS

This study was a prospective, single-blinded, randomized controlled trial that conducted at the Women Health Hospital, Faculty of Medicine, Assiut University, from August 2020 to May 2021, to study the effect of rectus muscle approximation by two techniques on postoperative pain. This trial was registered on ClinicalTrial.gov (NCT04108975) and approved by the ethical committee of Faculty of Medicine, Assiut University (IRB no: 17101124). We recruited (n=156) participants in this study. All were primigravidas, aged from 18 to 35 years, with single term pregnancy. They were randomly allocated to one of the three groups, non-approximation (group A)

group, approximation by 3 simple interrupted sutures (group B) and muscle closure by 3 vertical mattress sutures (group C).

Each group included (n=52) participants. We excluded multigravidas, multiple pregnancies, women with any medical or psychiatric disease and patients with prior abdominal or pelvic surgery. Furthermore, participants giving history of chronic use of analgesia or any allergy to analgesics were excluded.

To account for confounding factors, we followed the same surgical technique in three groups and all operations were conducted by senior obstetricians. Intravenous one gram of ceftriaxone (ceftriaxone, Sandoz, Holzkirchen, Upper Bavaria, Germany) was administered 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. A continuous Vicryl 0 suture was utilized for suturing parietal peritoneum. In group A, the rectus muscle was left without closure. The rectus muscles were approximated by three interrupted simple loose sutures in women of group (B) and three vertical mattress loose sutures in group (C) using Vicryl 0 suture. Continuous Vicryl 2 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 Vicryl 3/0 sutures.

Our 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 (Ketrolac 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.

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 ANOVA test followed by post-analysis. Level of confidence was kept at 95% and hence, *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 22.88 ± 3.90 years with mean gestational age 38.79 ± 1.17 weeks while mean age of women underwent re-approximation by vertical mattress sutures was 24.32 ± 5.42 years with mean gestational age 38.68 ± 1.09 weeks (Table 1).

Table 1: Age, gestational age, visual analogue score, postoperative analgesia, intraoperative blood loss and wound infection among enrolled groups

	Group A (n= 52)	Group B (n= 52)	Group C (n= 52)	P1	P2	P3
Age (year)	23.88 \pm 5.68	22.88 \pm 3.90	24.32 \pm 5.43	0.31	0.65	0.14
Gestational age (week)	38.52 \pm 1.19	38.79 \pm 1.17	38.68 \pm 1.09	0.23	0.49	0.61
VAS after 48 hours	2.86 \pm 1.61	4.26 \pm 2.19	4.80 \pm 2.36	< 0.001	< 0.001	0.19
Postoperative analgesia (mg)	170.76 \pm 30.85	227.50 \pm 50.52	237.11 \pm 56.19	< 0.001	< 0.001	0.30
Intraoperative blood loss (ml)	458.65 \pm 75.22	452.88 \pm 62.94	464.42 \pm 80.03	0.68	0.68	0.42
Wound infection	1 (1.9%)	2 (3.8%)	1 (1.9%)	0.50	0.75	0.50

Data expressed as mean. P value was significant if < 0.05 . VAS: visual analogue score.

P1 compares between non re-approximation and re-approximation by simple interrupted sutures.

P2 compares between non re-approximation and re-approximation by vertical mattress sutures.

P3 compares between re-approximation by simple interrupted sutures and re-approximation by vertical mattress sutures.

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 other studied groups. Women who had re-approximation either with simple interrupted sutures or vertical mattress sutures 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, Figure 1).

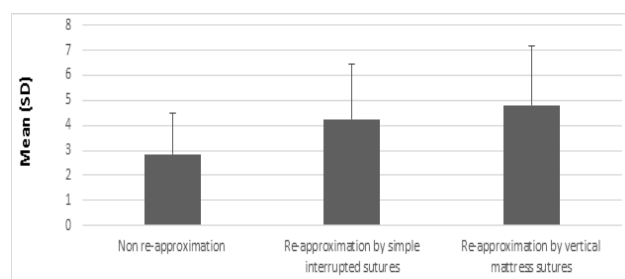


Fig. 1: Mean visual analogue at the end of 1st 48 hours postoperative among the studied groups

Post-operative analgesia during the 1st 48 hours postoperative among enrolled groups

Participants in group A reported significantly lower post-operative nonsteroidal anti-inflammatory drugs (NSAIDs) dose (170.76 ± 30.85 mg) in comparison to other groups. Both groups B and C 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, Figure 2).

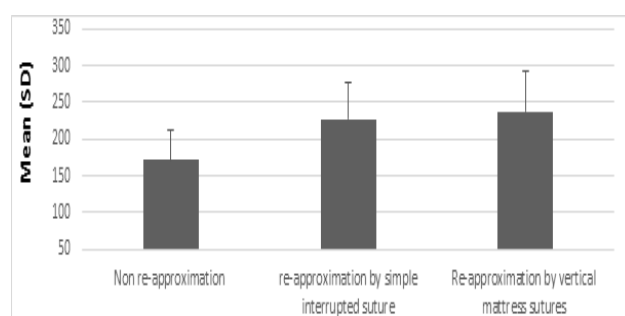


Fig. 2: Mean postoperative analgesia (NSAIDs) during 48 hours post CS of the studied groups

Intraoperative blood loss and wound infection

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

DISCUSSION

This randomized trial was designed to investigate the effect of different techniques of rectus muscle approximation during CS on postoperative pain. We recruited ($n=156$) participants. All participants received the same intraoperative anesthesia, adhered to the same postoperative pain management protocol, and similar surgical method. To account for possible confounding factors, only primigravida 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 other groups of rectus muscle approximation. We concluded that there was insignificant difference between the two groups of re-approximation either by 3 simple interrupted sutures or 3 vertical mattress sutures regarding postoperative pain score (P value = 0.19) and NSAIDs use (P value = 0.30).

Rectus muscle re-approximation has been widely considered to decrease postoperative adhesions^[4-9]. However, the main concern against this step during cesarean section is possible association with increased postoperative pain. In 2017, Lyell *et al* deemed their study to be the first to evaluate the association between rectus muscle re-approximation and postoperative pain in the literature from 1960 to 2016. 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 modest increase of movement pain and short-term postoperative opioid intake in the group undergoing rectus muscle re-approximation^[10]. 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 raise the analgesic requirements among women undergoing primary Cesarean section^[11].

In comparison with the study of Lyell *et al* we do not agree with their results of postoperative analgesia use. Lyell and co-authors found the total opioid and NSAIDs use were similar between both groups^[10]. This difference in analgesic requirement may be due to the bigger sample size of our study with a subsequent higher power. 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 previous two studies who reported no effect of rectus muscle closure on the intraoperative blood loss^[10-11]. 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 decrease in postoperative adhesions and prevention of diastasis of recti. Therefore, a long-term follow up should be designed to assess postoperative adhesions and diastasis of recti and to compare the potential benefits with rise in postoperative pain and analgesia intake.

CONCLUSION

It seems that non closure of the rectus muscle at the CS has lower post-operative pain with less analgesia intake. Different techniques of muscle re-approximation during CS will increase demands for analgesic requirements with increase pain postoperative in both techniques of re-approximation.

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CONFLICT OF INTERESTS

There are no conflicts of interest.

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