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Original Article

How Abdominal Irrigation During Cesarean Delivery Affects Gastrointestinal Functions and Short-term Maternal Morbidities: A Randomized Controlled Study

Sezeryan Doğum Sırasında Abdominal İrrigasyon Gastrointestinal Fonksiyonları ve Kısa Dönem Maternal Morbiditeyi Nasıl Etkiliyor: Randomize Kontrollü Çalışma

Canan SATIR OZEL, Zelal Rojda GUNGORDU, Nisan Helin DONMEZ, Ergul DEMIRCIVI, Oguz Devrim YARDIMCI, Abdulkadir TURGUT

Istanbul Goztepe Prof. Dr. Suleyman Yalcin City Hospital, Clinic of Obstetrics and Gynecology, Istanbul, Turkey

ABSTRACT

Objective: This study aimed to investigate the effectiveness of intraabdominal irrigation with saline on postoperative gastrointestinal functions and short-term complications in patients who underwent cesarean section under general anesthesia.

Methods: This prospective randomized controlled clinical trial was conducted between March 2022 and May 2022 and included 60 patients who underwent elective cesarean. The participants were randomized into two groups: abdominal irrigation (n=30) and control group (n=30). Participants undergo a standard cesarean procedure, and general anesthesia was preferred. The patients were questioned regarding nausea, vomiting, highest pain scores, time of flatus, and stool passage during the postoperative period.

Results: Although no significant differences were found between the two groups (p>0.05), the return of bowel functions, i.e., passage of flatus and stool, occurred in a shorter period in the irrigation group (19.53 and 34.63 versus 16.73 and 33.7). The postoperative visual analog scale (VAS) scores of the two groups were comparable; VAS score of 4-6 was the sole difference when comparing both groups. Although postoperative vomiting was more common in the control group, no significant difference in postoperative vomiting, postoperative nausea, and postoperative antiemetic need was found between the two groups (p>0.05).

Conclusions: The results revealed that intraoperative abdominal irrigation did not affect gastrointestinal functions and short-term maternal morbidity and did not provide additional benefits.

Keywords: Cesarean section, emesis, vomiting, anesthesia, irrigation

ÖZ

Amaç: Bu çalışmada, genel anestezi altında sezaryen uygulanan hastalarda intraabdominal salin ile irrigasyonun postoperatif gastrointestinal fonksiyonlar ve kısa dönem komplikasyonlar üzerindeki etkinliği araştırıldı.

Yöntemler: Bu prospektif randomize klinik çalışmaya Mart 2022 ile Mayıs 2022 arasında elektif sezaryen operasyonu geçiren 60 hasta dahil edildi. Katılımcılar iki gruba ayrıldı; abdominal irrigasyon (n=30) ve kontrol grubu (n=30). Katılımcılara standart sezaryen prosedürü uygulandı ve genel anestezi tercih edildi. Hastalar operasyon sonrasında bulantı, kusma, ağrı skorlaması ve gaz gaita deşarj süresi açısından sorgulandı.

Bulgular: Her iki grup arasında istatistiksel fark bulunmamakla birlikte (p>0,05), irrigasyon yapılan grupta gaz ve gaita çıkışı üzerinden incelenen bağırsak fonksiyonlarının süre olarak daha kısa zamanda geri döndüğü görülmüştür (19,53 ve 34,63'e ile 16,73 ve 33,7). İki grup karşılaştırıldığında, vizüel analog skala (VAS) 4-6 skoru hariç, postoperatif VAS skorları iki grupta benzer sonuçlanmıştır. Postoperatif dönemde kusma şikayeti kontrol hastalarında daha yaygın görülmüş olmakla birlikte; iki grup istatistiksel olarak karşılaştırıldığında postoperatif kusma, bulantı ve antiemetik ihtiyacı açısından anlamlı fark bulunamamıştır (p>0,05).

Sonuçlar: Operasyon sırasında batın yıkamanın gastrointestinal fonksiyonları ve kısa dönem maternal morbidite üzerine etkisi olmadığını ve ek fayda sağlamadığını tespit ettik.

Anahtar kelimeler: Sezaryen, bulantı, kusma, anestezi, irrigasyon

Address for Correspondence: Z. R. Gungordu, Istanbul Goztepe Prof. Dr. Suleyman Yalcin City Hospital, Clinic of Obstetrics and Gynecology, Istanbul, Turkey
E-mail: zelal_gungordu@hotmail.com **ORCID ID:** orcid.org/0000-0002-2995-9077

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INTRODUCTION

Although cesarean section (CS) is one of the commonly performed surgical methods, the surgical procedure steps are controversial in various aspects, such as abdominal irrigation, in terms of its effect on surgical morbidity[1,2]. Since gynecologist Joseph Price first proposed abdominal irrigation in 1905, some surgeons have published articles favoring it and others against it[3]. At present, the choice depends on the surgeon's preference and experience[4]. Performing abdominal irrigation in patients during cesarean operation lacks scientific evidence, and published randomized controlled trials on the subject are insufficient.

In current literature, a meta-analysis including 863 women, irrigation during CS increased the risk of intraoperative and postoperative nausea and intraoperative emesis and need for postoperative antiemetics. Two of the studies evaluated in that meta-analysis were related to cesareans performed under regional anesthesia, and the third one did not specify the anesthesia technique[5].

Another study found that abdominal saline irrigation has no benefits or adverse effects during CS in terms of maternal infectious morbidity[6].

This study aimed to investigate the effect of abdominal irrigation on gastrointestinal tract movements and short-term complications in CS.

MATERIALS and METHODS

This prospective randomized controlled clinical study was conducted between March 2022 and May 2022. Ethical committee approval was obtained from the Istanbul Medeniyet University Goztepe Training and Research Hospital (decision no: 2020/0139, date: 16.03.2022). Informed consent was taken from each patient. The inclusion criteria for the study were term (≥37 weeks) and singleton pregnancies that underwent elective CS under general anesthesia. The exclusion criteria were as follows: local anesthesia during surgery, chronic diseases including gastrointestinal, neurologic, and endocrinologic pathologies, CS with emergency indications, maternal coagulopathy, chorioamnionitis, placenta previa, placenta accreta, and mental retardation. Elective CS was defined as CS performed before the presence of labor with or without previous CS history. Primary CS was used for women without an earlier CS history.

All participants completed a questionnaire regarding their parity, age, body mass index, comorbidities, current medication, and tobacco use. Then, the patients were randomized into the control and study groups. The study group was composed of patients indicated for abdominal irrigation during CS. A random number table was used to assign patients to either one of the groups. Patients' treatments are held in sequentially numbered secure, opaque envelopes. After routine abdominal cleaning, surgeons were informed by the operating nurse, who opened the envelope for each randomized patient before the operation. A Foley catheter was inserted into every patient before CS. Povidone-iodine solution was used for skin preparation. General anesthesia was used for all participants. Patients indicated for regional anesthesia were excluded because they may experience nausea, even perioperatively; therefore, an additional antiemetic drug can affect the results. The first author and her team (obstetrics and gynecology surgeons: C.S.O. and Z.R.G) performed all procedures. Following Pfannenstiel incision, fascial aponeurosis was separated from the rectus abdominis muscles in cranial and caudal directions. The rectus muscles were divided on the midline after the caudal-cut aponeurosis was elevated under tension. The peritoneum was opened in an identical manner using a vertical midline incision. A bladder flap was not a routine step otherwise, if not necessary. Kerr incision was created with a scalpel, followed by blunt expansion. After the umbilical cord clamping, the anesthetist administered a 10 IU intravenous bolus of oxytocin over 5-10 s to each patient. The placenta was delivered. A total of 3,000 mL of lactated Ringer solution containing 60 IU of oxytocin was administered for 24 h. Antibiotic prophylaxis with 1 g cefazolin was administered routinely, and no additional drugs were used during the operation. After the exteriorization of the uterus, the hysterotomy incision was closed.

All blood clots and other remnants were manually externalized with a sponge holder forceps from the pelvic areas following the uterine incision closure. Then, 1,000 mL of warm saline irrigation was poured into the vesicouterine cavity and aspirated as much as possible in the reverse Trendelenburg position using an aspirator, carefully avoiding any contact with the intestines.

The abdominal wall layers, including the peritoneum, were closed in every procedure. Subcutaneous tissue cauterization was performed to secure hemostasis. Moreover, 3-0 polygactin 90 sutures were used to close the skin incision. Participants received the same postoperative care. Postoperative uterine contraction was checked every 15 min for 2 h and then every 4 h. Urinary catheters were removed on the day after the operation. The physician staff responsible for collecting patients who reported nausea and vomiting symptoms was blinded to

group randomization. Following the visual analog scale (VAS) explanation to all participants, the highest pain scores at 0-1, 4-6, 10-12, and 22-24 h during postoperative follow-up were noted. On postoperative day 1, patients' surgical incisions were examined. Requirements for antiemetic drugs and return of gastrointestinal function were recorded, and a complete blood count was ordered for each patient. The primary outcome measured was the time of the first passage of flatus. Return of bowel function was defined as the passage of flatus. Secondary outcome measures were the occurrence of postoperative infections, including endometritis. On bimanual examination, postpartum endometritis was described as a body temperature over 38.5 °C in addition to the presence of foul-smelling discharge or unusually tender uterus. The body temperature should be ≥38 °C for at least 24 h after surgery, described as febrile morbidity, which was not related to other indications of infection. Wound infection was defined as the partial or total separation of the incision presenting with a purulent or serous wound discharge with induration, warmth, and tenderness.

To calculate intraoperative blood loss, the volume in the suction apparatus and used swabs were measured. After translating swab weights into mL, using blood density (1,050 g/mL), the irrigation amount (1,000 mL) was subtracted from the calculated volume.

Another researcher (H.N.D), who was blinded to the group assignments, recorded and analyzed the data.

Statistical Analysis

Descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, and maximum), as well as data distribution, were evaluated using the Shapiro-Wilk test. The Mann-Whitney U test was used to analyze quantitative data, and the chi-square test was used to determine the relationship between qualitative data. Significance was set at $p<0.01$ and $p<0.05$.

RESULTS

A total of 60 patients were randomized, with 30 patients in the control group and 30 in the irrigation group (Figure 1). All patients received the treatment, which they were randomized, and none of them were lost during follow-up or withdrew from the study. No significant difference was found in the age, gestation weeks, and other maternal demographics. Additionally, indications for CS, operation time, perioperative blood loss, and neonatal outcomes (5-min APGAR score, neonatal intensive care unit admission, and birth weight) were comparable for the study and control groups. The primary cesarean rates were 43.3% and 23.3%, the secondary cesarean rates were 40% and 46.6%, and the third and above cesarean rates were 16.6% and 30% in the control and study groups, respectively (Table 1).

During the first month following surgery, postoperative infectious morbidities such as postpartum endometritis, febrile morbidities, urinary tract infection, and surgical site infections were not observed in either group.

Postoperative outcomes such as gastrointestinal functions (i.e., passage of flatus, passage of stool, vomiting, nausea, and need for antiemetic), VAS scores, preoperative and postoperative hemoglobin, hematocrit, and white blood cell counts are shown in Table 2. VAS score of 4-6 was the sole difference when comparing both groups. The irrigation group had a score of 5.27, whereas the control group had 6.67 ($p=0.003$). Despite the lack of significance ($p>0.05$), the return of bowel functions, stated as the passage of flatus and stool, occurred in a shorter period in the irrigation group versus control group (19.53 and 34.63 versus 16.73 and 33.7).

Although postoperative vomiting was more common in the control group, no significant difference was found between the control and irrigation group (16.6% and 6.6%, $p>0.05$). Moreover, no significant relationship was found between the groups when comparing postoperative nausea and postoperative antiemetic need ($p>0.05$).

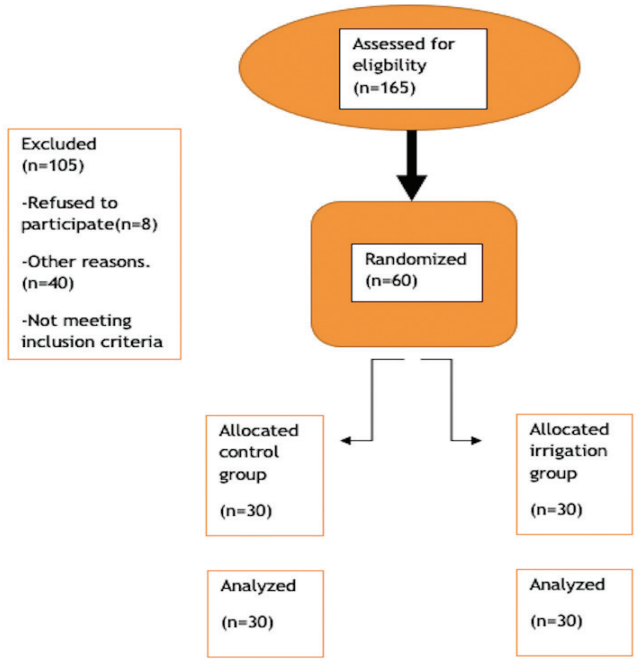

Figure 1. Flow chart of the study.

Table 1. Demographic characteristics of the cesarean delivery groups.			
	Control (n=30)	**Irrigation (n=30)**	**p**
Age*	29.6±6.25	29±5.41	0.64
Gestational week*	38.68±1.1	38.65±0.82	0.96
BMI (kg/m^2)*	30.05±4.89	30.15±4.28	0.49
Tobacco use**	2 (6.6%)	2 (6.6%)	0.99
Comorbidities**	3 (10%)	3 (10%)	0.99
Operation time (min.)*	50.07±12.67	48.73±15.34	0.53
Perioperative blood loss (mL)*	357±169.22	300.67±124.79	0.14
5-min APGAR*	9.38±0.62	9.53±0.57	0.33
NICU admission**	6 (20%)	4 (13.3)	0.99
Birth weight (g)*	3376.03±570.13	3330.83±568.32	0.76
Number of CS**			
Primary CS	13 (43.3%)	7 (23.3%)	0.213
2nd CS	12 (40%)	14 (46.6%)	
3rd and above	5 (16.6%)	9 (30%)	
Gravidity**			
G1	7 (23.3%)	4 (13.3%)	0.145
G2	9 (30%)	12 (40%)	
G3	5 (16.6%)	11 (36.6%)	
G4	5 (16.6%)	1 (3.3%)	
≥G5	4 (13.3%)	2 (6.6%)	
*Mann-Whitney U test, **Chi-square test, BMI: Body mass index, NICU: Neonatal intensive care unit, CS: Cesarean section			

Table 2. Laboratory values, VAS scores, postoperative and gastrointestinal functions (passage of flatus, stool passage, nausea, vomiting, and antiemetic needs).			
	Control (n=30)	**Irrigation (n=30)**	**p**
Flatulence time (h)*	19.53±8.22	16.73±6.46	0.2
Stool passage (h)*	34.63±6.65	33.7±8.87	0.81
Postoperative emesis**	6 (20%)	7 (23.3%)	0.500
Postoperative vomiting**	5 (16.6%)	2 (6.6%)	0.212
Postoperative antiemetic need**	6 (20%)	4 (13.3%)	0.365
VAS scores*			
VAS 0-1	8.1±1.63	8.23±1.74	0.623
VAS 4-6	6.67±1.56	5.27±1.64	0.003**
VAS 10-12	4.2±1.32	3.53±1.63	0.088
VAS 22-24	1.7±1. 64	1.27±1.31	0.347
Blood count*			
Preop Hg	11.28±1.32	11.37±1.57	0.842
Postop Hg	10.21±1.26	10±1.52	0.574
Preop-postop Hg	1.19±0.87	1.25±0.65	0.855
Preop Htc	33.16±3.96	32.89±4.2	0.744
Postop Htc	29.93±3.53	29.5±3.73	0.572
Preop-postop Htc	3.23±2.12	3.39±1.45	0.471
Preop WBC	11.84±3.58	11.66±3.15	0.739
Postop WBC	16.2±3.2	15.27±3.63	0.424
Preop-postop WBC	-4.35±2.64	-3.61±1.87	0.141
*Mann-Whitney U test, **Chi-square test, Hg: Hemoglobin, Htc: Hematocrit, WBC: White blood cell, VAS: Visual analog scale			

DISCUSSION

Abdominal irrigation is used in various abdominal surgeries, but its clinical benefits are still controversial. The main premise of its use is to remove blood, amnion, and various body fluids from the abdomen[7]. Although saline irrigation has been preferred in abdominal surgeries to reduce infectious morbidity, there are no clear recommendations for it[8].

In some controlled studies, no significant difference was found between the control and irrigation groups, and in some other studies, saline irrigation was disadvantageous in terms of intraoperative emesis and vomiting[5]. In their study, Viney et al.[9] and Temizkan et al.[6] reported increased intraoperative nausea, intraoperative vomiting, and postoperative nausea in the abdominal irrigation groups. In addition, postoperative antiemetic need showed significance in the irrigation groups of both studies. Although both studies have evaluated intraoperative nausea and vomiting in surgeries under regional anesthesia, the hypotensive effect of this anesthesia type should be considered. Our study differs from the literature because it enrolled patients who received general anesthesia. In our study, postoperative vomiting and the need for antiemetics were less frequent in the irrigation group, but no significant difference was observed. Likewise, no significant difference was observed when the control group was compared in terms of gas and stool discharge, which are other gastrointestinal factors.

Another point of attention is whether there is a difference in blood loss between surgeries with and without irrigation. Decreased blood loss was observed in the study group of Harrigill et al.[10]. By contrast, opposite results were obtained by Temizkan et al.[6] In the present study, although less operative bleeding was observed in the study group in correlation with Viney et al.[9], it was not significant.

Postoperative pelvic pain also significantly affected patients' quality of life and can prolong the mean time to ambulation[11]. One of the aims of abdominal irrigation is to reduce postoperative inflammation and pelvic pain by cleaning the amnion, vernix, and coagulum that may be scattered in the abdomen during CS[12,13]. During postoperative evaluation, pain was evaluated by identifying VAS scores, and irrigation did not differ in terms of this pain except for VAS scores of 4-6, which was significantly higher in the control group.

Although we could not show the benefit of abdominal irrigation in our study, many factors must be excluded to say that it has no clear benefits, e.g., anesthesia differences and surgical techniques which vary from person to person[14]. In addition, considering the small number of patients in our study, the reported results are not significant; thus, they should be regarded as preliminary. Although irrigation may not be significantly beneficial in the short term, it may have long-term effects as well.

CONCLUSION

In this randomized controlled trial, although no additional benefit was found in the abdominal irrigation group, except for VAS scores of 4-6, no significant difference was noted in the results when compared with those of the control group. Abdominal irrigation is a simple and cost-effective procedure that does not prolong the operation time and does not require surgical experience. However, our study and most of the current studies on the topic have shown that abdominal irrigation has no beneficial effects on gastrointestinal functions and maternal morbidity. Further randomized prospective studies with larger sample sizes are essential to confirm the potential effects of abdominal irrigation.

Ethics

Ethics Committee Approval: Ethical committee approval was obtained from the Istanbul Medeniyet University Goztepe Training and Research Hospital (decision no: 2020/0139, date: 16.03.2022).

Informed Consent: Informed consent was taken from each patient.

Peer-review: Externally and internally peer-reviewed.

Author Contributions

Surgical and Medical Practices: C.S.O., Z.R.G., E.D., Concept: C.S.O., Z.R.G., N.H.D., E.D., O.D.Y., A.T., Design: C.S.O., Z.R.G., N.H.D., E.D., O.D.Y., A.T., Data Collection and/or Processing: C.S.O., Z.R.G., N.H.D., E.D., O.D.Y., A.T., Analysis and/or Interpretation: C.S.O., N.H.D., E.D., O.D.Y., A.T., Literature Search: C.S.O., Z.R.G., N.H.D., E.D., O.D.Y., A.T., Writing: C.S.O., Z.R.G., N.H.D., E.D., O.D.Y., A.T.

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