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The effect of intraperitoneal irrigation with saline at body temperature on post-cesarean section pain

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Abstract
Aim: This study aimed to compare the effect of intraperitoneal irrigation with saline at body temperature and drying with a sponge on pain and other early morbidities after cesarean section.
Material and Methods: This prospective observational study was included 347 patients between November 2020 and January 2021. We designed two groups of patients whose abdomen was washed with saline or dried with a sponge during a cesarean section. The saline used was heated in sterile blood and fluid warmer, and the temperature was measured with a sterile mercury thermometer. Parameters such as VAS scores of the patients at specific periods, 6th, and 24th-hour Hb-Wbc values, and gas discharge time were compared.
Results: The leukocyte value after 24 hours of cesarean was significantly lower, and the 24th-hour VAS score was higher in the group that was washed with isotonic and compared with the group that was dried with a sponge. In patients who had their first cesarean section, the 2nd-hour VAS score was lower in the saline-washed group than in the group cleaned with a sponge. In patients with previous cesarean section, the rate of flatulence at postoperative day 0 was significantly higher in the group that was washed with isotonic compared to the group that was dried with a sponge. The VAS score after 24 hours was also significantly higher.
Discussion: It may be beneficial to clean with intraperitoneal saline irrigation or a sponge to reduce postoperative pain and return early bowel movements, especially in patients with previous surgery and possible intraabdominal adhesions.

Keywords
Cesarean Section, Pain, Postoperative, Peritoneal Lavage

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Introduction

Cesarean section is one of the primary surgical procedures in emergencies that may arise before and during delivery. The fetus is taken out through an incision made through the abdominal wall and is widely practiced today. The cesarean section rate is 53.1% in our country, Turkey, and it ranks first in the world with this rate. After Turkey, Mexico comes with 46.8%, Chile with 46%, and Korea with 38% [1].

Although the cesarean section is highly preferred, many complications may occur in the postoperative period in the mother and baby, depending on the anesthesia method and surgical intervention. Postpartum uterine atony, maternal death, respiratory tract aspiration, thromboembolic events, wound infection, adhesions, and subfertility may occur due to cesarean section delivery in the mother [2].

One of the essential problems after cesarean section is abdominal pain [3]. In the postpartum period, uterine contractions due to involution and oxytocin release play a role in the emergence of postpartum abdominal pain. In addition to the abdominal pain experienced after cesarean section, it is caused by the incision tissue in the abdominal region due to surgery and is 24-48. There is also acute pain that can be seen between hours [3-5].

Pain after cesarean section affects mothers negatively. As a result of pain, decrease in vital capacity, atelectasis, as well as difficulties in performing daily life activities, not being able to take care of the newborn adequately, breastfeeding, depression, anxiety, insomnia, deterioration in body image, and many adverse effects such as chronic pain can be observed [6-8].

In their study, Kintu et al. [9] reported that the most pain was experienced in the first 6-24 hours after the operation after cesarean section. In the survey conducted by Amanak and Karaçam [10], it was reported that 54.9% of women who had a cesarean section experienced postoperative pain between 1-3 days after the operation.

Considering the above issues, managing pain experienced after a cesarean section is extremely important. Relief of postoperative pain after cesarean section will help eliminate adverse conditions such as depression and anxiety and physical complications that may arise due to pain, thus increasing the quality of life of women [6-8].

Although non-opioid and opioid analgesics are primarily used in managing pain after cesarean section, they are not fully effective in relieving pain. They can also cause respiratory depression, sedation, nausea, vomiting, urinary retention, itching, and decreased milk production in the mother [7,11,12].

We designed this study to evaluate the effects of intraperitoneal irrigation with saline at body temperature and drying with a sponge on post-cesarean section pain and other early morbidities. In this context, we are planning to add differences to the cesarean section procedure in terms of the postoperative comfort of the patient and to shed light on future studies.

Material and Methods

Our study included 347 patients who had cesarean section between November 2020 and January 2021 at the Health Sciences University Bursa Yüksek İhtisas Training and Research Hospital Gynecology and Obstetrics department. We designed our research as a prospective observational study.

Bursa Yüksek İhtisas Training and Research Hospital Clinical Research and Ethics Committee approved the study with the protocol decision dated 22.07.2020 and protocol number 2011-KAEK-25 2020/07-03. The volunteers were informed in detail, and the 'Informed Voluntary Consent Form' was read and signed. This research was conducted with pregnant women aged 18-45 years, 37 weeks of gestation and above, with no known systemic disease, and with normal fetal development. Patients who did not meet these criteria were not included in the study.

We randomly divided 347 pregnant women who delivered by cesarean section into two groups. We performed intraperitoneal irrigation with 500 cc of saline at body temperature (36.5-37°C) to the patients in the first group. For the patients in the 2nd group, we performed drying of the inside of the abdomen with a sponge, which is a more common method in routine practice, and we accepted it as the reference group. Our study also divided the patients into two groups according to previous uterine surgery. The primary cesarean section group constituted the first group, and the patients with previous cesarean section constituted the second group (former cesarean section). The studied parameters were also compared between these groups. The first 24 hours after the cesarean section was postoperative day 0, and the next 24 hours were indicated as postoperative day 1.

The saline used was heated in a sterile fluid heater, and the temperature was measured with a sterile mercurial thermometer.

Standard spinal anesthesia was administered to the participants by the anesthesia team of our hospital. The operation started with the standard cesarean section procedure. After the uterine Kerr incision was closed, the patients in the 1st group were washed, aspirated and the operation was terminated with the continuation of the standard procedure. For the 2nd group, the inside of the abdomen was dried with sterile sponges.

All patients in the study received the same fluid and analgesia therapy during the operation. In case of any complication involving uterine atony or other intra-abdominal organ damage during the operation, the participant was excluded from the study, not washed, or included in the control group.

On the postoperative days 0 and 1, 75 mg diclofenac sodium was injected intramuscularly every 6 hours, and 500 mg paracetamol was given peroral for analgesia.

Participants' age, number of pregnancies, previous cesarean sections, flatus time, postoperative 6th and 24th-hour hemoglobin, and leukocyte values were noted on the forms, including the VAS scale. Postoperative 2nd, 6th and 24th-hour VAS (visual analog scale) scores were evaluated and noted by visiting patients.

Statistical analysis

Statistical analyzes were performed using the SPSS version 24.0 (IBM for Windows) package program. The sample calculation planned to include 347 participants with a 95% confidence interval and 80% power using the G-Power 3.1 program. Descriptive statistics were expressed as mean ± standard deviation in normally distributed data and median (minimum-maximum) in non-normally distributed data. Numerical data

were expressed as n (%). In comparing two dependent groups, the Mann-Whitney U test was used to analyze non-normally distributed data, and Student's t-test was used for normally distributed data. Pearson CI-Square test was used to compare categorical data between groups. The cut-off value of p<0.05 was considered significant.

Results

The clinical and demographic characteristics of the volunteers are presented in Table 1. A total of 347 volunteers were included in the study.

They were divided into two groups as sponge drying and intraperitoneal irrigation in terms of the method of peritoneal cleaning used. There was no significant difference between these groups in terms of characteristic features (p<0.05) (Table-1).

We compared the groups' clinical findings and laboratory parameters in the abdominal cleaning method. The leukocyte value 24 hours after the cesarean section in the isotonic washing group was lower than in the sponge cleaning group (p<0.05). In contrast, the VAS score after 24 hours was significantly higher at the border (p=0.05). There was no significant difference between the groups regarding other clinical findings (Table 1).

We divided the patients into two categories: postoperative days 0 and 1 and compared them according to the time of gas removal. There was no significant difference between the flatus times of the groups. (p>0.05) (Table-2).

Both abdominal cleaning methods were analyzed for gas removal time in the previous cesarean section group of volunteers. Accordingly, when patients who had previous cesarean sections were irrigated intraperitoneally with saline, it was observed that intestinal gas was released in the earlier period (p<0.05) (Table-2).

Among the volunteers, VAS scores at 2, 6, and 24 hours were analyzed for both abdominal cleaning methods in the primary cesarean section group. Accordingly, when patients with primary cesarean section were irrigated intraperitoneally with saline, the VAS score after 2 hours was found to be significantly lower (p<0.05) (Table 3).

VAS scores after 2,6 and 24 hours were analyzed among the volunteers for both abdominal cleaning methods in the previous cesarean section group. Accordingly, when patients with previous cesarean sections were irrigated with saline intraperitoneally, the VAS score after 24 hours was found to be significantly higher (p<0.05) (Table 3).

Discussion

This study observed that the leukocyte value, one of the infection follow-up parameters, was significantly lower 24 hours after the cesarean section when the saline irrigation group was compared with the sponge cleaned group. In patients who had their first cesarean section, when the group that was washed with isotonic was compared to the group that was cleaned with a sponge, the postoperative 2nd-hour VAS score was significantly lower. In patients with previous cesarean section, the rate of flatulence was higher at postoperative day 0 when the group that was washed with isotonic was compared with the group that was dried with a sponge.

Table 1. Comparison of clinical and demographic characteristics of the groups in terms of abdominal cleaning method

Parameters	Cleaning with a sponge group (n=187) Median (min-max)/ Mean±SD	Washing with the saline group (n=160) Median (min-max)/ Mean±SD	P
Age	30 (18-44)	28.5 (19-44)	0.368
Number of Pregnancy	3 (1-8)	3 (1-8)	0.620
Number of Births	1 (0-7)	2 (0-5)	0.200
6th-hour leukocyte value (10^3/ml)	13.500 (4.300-24.700)	13.300 (5.000-22.700)	0.270
24th-hour leukocyte value (10^3/ml)	11.200 (3.000-21.400)	10.500 (4.900-19.300)	0.016
6th-hour hemoglobin value (g/dl)	10.8 (6.7-14.1)	11 (7.1-14.2)	0.685
24th-hour hemoglobin value (g/dl)	9.9 (7-13.9)	10 (6.8-13.3)	0.199
2nd-hour vas score	8 (1-10)	7 (2-10)	0.076
6th-hour vas score	4 (1-9)	4 (1-8)	0.765
24th-hour vas score*	1.9±1.4	2.3±1.3	0.057
Percentage of leukocyte decrease (%)*	15±27	18.6±14.6	0.161
Hemoglobin decrease percentage (%)*	8.5±7.9	7.6±9	0.387
6th-hour leukocyte value	13.500 (4.300-24.700)	13.300 (5.000-22.700)	0.270

Student's t-test *p<0.05 and Mann-Whitney U test p<0.05 significant. min: minimum, max: maximum, g/dl: grams/deciliter,10^3/ml: 1000/milliliter

Table 2. Comparison of intestinal gas removal status between the groups and in previous cesarean groups in terms of the abdominal cleaning method

Between the groups	Flatus				
	Postoperative day 0	Postoperative day 1	n	X^2	P
Cleaning with a sponge group	97 (%51.9)	90 (%48.1)	187 (%100)	0.869	0.351
Washing with the saline group	91 (%56.9)	69 (%43.1)	160 (%100)		
Previous cesarean section groups	**Flatus**				
	Postoperative day 0	Postoperative day 1	n	X^2	P
Cleaning with a sponge group	50 (%47.6)	55 (%52.4)	105 (%100)	4.139	0.029
Washing with the saline group	67 (%61.5)	42 (%38.5)	109 (%100)		

Pearson Chi-Square, p<0.05 was considered significant

Table 3. Comparison of pain scores in terms of abdominal cleaning method between the groups and in previous cesarean groups

Between the groups	Method		
	Cleaning with a sponge group (n=82)	Washing with the saline group (n=51)	P
2nd-hour VAS score	8 (2-10)	7 (2-9)	0.005
6th-hour VAS score	5 (1-9)	4 (1-8)	0.472
24th-hour VAS score	2 (0-6)	2 (1-5)	0.369
Previous cesarean section groups	**Method**		
	Cleaning with a sponge group (n=105)	Washing with the saline group (n=109)	P
2nd-hour VAS score	7 (1-10)	7 (2-10)	0.758
6th-hour VAS score	4 (1-8)	4 (2-8)	0.595
24th-hour VAS score*	1.86±1.4	2.2±1.3	0.043

Mann-Whitney U test, Student's t-test*
Median (min-max), Mean±SD, p<0.05 significance cut-off

Cesarean section is a comprehensive surgical method in gynecology practice. One of the most common and essential complaints in the postoperative period is pain. Control of postoperative pain is essential in reducing morbidity in this period. The patient's responsibility to take care of the newborn, the necessity of establishing early mother-infant communication, and the risk of transition of medical treatments to breast milk are the aspects of pain control after the cesarean section that differ from other surgeries [13].

The determinants affecting postoperative pain are not precise. The feeling of pain is related to the age, gender, perception of pain, past experiences, and socio-cultural characteristics of the society in which they live. The mood and anxiety level in the preoperative period also influence pain felt after a cesarean section. Abnormal body position, musculoskeletal pain due to immobility, and inflammatory damage at the surgical incision site also affect postoperative pain [14-16].

Treatment of postoperative pain is crucial in early recovery of bowel functions, prevention of paralytic ileus, reduction of intra-abdominal and incisional surgical site infection, preventing of pulmonary-thromboembolic complications, and even maternal morbidity and mortality [17-19].

Intra-abdominal antiseptic solutions (chlorhexidine, povidone-iodine), antibiotics, and irrigation with saline have been investigated to manage postoperative pain and morbidities such as early ileus and infection. In these studies, intraoperative and postoperative nausea, vomiting, and antiemetic needs were higher in the irrigated groups [20,21], [available at: https://www.ncbi.nlm.nih.gov/books/NBK569604/].

Our study used saline because it is easily accessible, inexpensive, and frequently preferred by surgeons. We used 500 cc saline for irrigation, but customized amounts could be applied considering the patient's BMI, weight, or height.

In our study, we planned to evaluate the pain level of our volunteers with the VAS (visual analog scale) score, which is a subjective one-dimensional evaluation method at the postoperative 2nd, 6th, and 24th hours, which we apply as a standard in our clinic. The pain level could have been evaluated more frequently and in more significant numbers, or subjective multidimensional scales could have been used, and objective methods based on physiological neuropharmacology could have been used. Since there were insufficient data to evaluate the need for narcotic analgesics after cesarean section, we did not include it in the study to disrupt the standardization.

There may be new-onset micro- or macro-level adhesions after previous abdominal surgery. In our study, a significantly earlier return of bowel movements in patients with previous cesarean section in the saline irrigation group compared to the sponge cleaning group may be related to this situation.

Conclusion

In conclusion, in the early period after cesarean section, the mother's well-being (pain, bowel peristalsis, infection) can be improved with abdominal cleaning methods applied during cesarean section. This procedure may be beneficial in terms of the mother's comfort, self-efficacy, and meeting the newborn's needs (breastfeeding, establishing a mother-infant relationship, caregiving competence anxiety). When we consider the existing literature, prospective studies with more significant patients are needed.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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References

1. Başer E, Kırmızı DA, Özdemirci Ş, Kasapoğlu T, Demirdağ E, Tapısız ÖL, et al. An evaluation of cesarean rate in turkey by the Robson ten group classification system: How to reduce cesarean rates? Journal of Surgery and Medicine. 2020;4(11):1031–5.

2. Mascarello KC, Horta BL, Silveira MF. Maternal complications and cesarean section without indication: systematic review and meta-analysis. Rev Saude Publica. 2017;51:105.

3. Tan H S, Diomede O, Habib A. S. Postoperative analgesia after cesarean delivery. International Anesthesiology Clinics. 2021; 59(3): 90-7.

4. Demelash G, Berhe YW, Gebregzi AH, Chekol WB. Prevalence and Factors Associated with Postoperative Pain After Cesarean Section at a Comprehensive Specialized Hospital in Northwest Ethiopia: Prospective Observational Study. Open Access Surgery. 2022;15:1–9.

5. Holdcroft A, Snidvongs S, Cason A, Dore C, Berkley K. Pain and uterine contractions during breast feeding in the immediate post-partum period increase with parity. Pain. 2003;104:589–96.

6. Chen Y, Ye X, Wu H, Huang X, Ke C, Chen Y, et al. Association of Postpartum Pain Sensitivity and Postpartum Depression: a prospective observational study. Pain and Therapy. 2021;10(2):1619–33.

7. Azanu WK, Osarfo J, Larsen-Reindorf RE, Agbeno EK, Dassah E, Amanfo AO, et al. Assessment and determinants of acute post-caesarean section pain in a tertiary facility in Ghana. PLoS One. 2022; 17(5): e0268947

8. Mahfouz I, Asali F, Khalfieh T, Saleem H, Diab S, Samara B, et al. Early initiation of breastfeeding: Antenatal, peripartum, and neonatal correlates. Journal of Clinical Neonatology. 2022;11(1):30–7.

9. Kintu A, Abdulla S, Lubikire A, Nabukenya MT, Igaga E, Bulamba F, et al. Postoperative pain after cesarean section: assessment and management in a tertiary hospital in a low-income country. BMC Health Serv Res. 2019;19(1):1–6.

10. Amanak K, Karaçam Z. Sezaryen ile doğum yapan kadınların postpartum erken dönemde öz bakım ve bebek bakımı konularında yaşadıkları sorunların belirlenmesi (Determining the problems experienced by women who gave birth by cesarean section in the early postpartum period in terms of self-care and baby care). İzmir Tepecik Eğitim Hastanesi Dergisi / Journal of Izmir Tepecik Training Hospital. 2018;28(1):17–22.

11. Jin Z, Zhu M, Gupta A, Page C, Gan TJ, Bergese SD. Evaluating oliceridine as a treatment option for moderate to severe acute post-operative pain in adults. Expert Opin Pharmacother. 2022;23(1):9–17.

12. Meyer MF, Broman AT, Gnadt SE, Sharma S, Antony KM. A standardized post-cesarean analgesia regimen reduces postpartum opioid use. J Matern Fetal Neonatal Med. 2021;1–8.

13. Benli TE, Derya YA, Oztas HG. Impact of delivery mode and maternal postpartum functional state on breastfeeding self-sufficiency. J Clin Med Kaz. 2020;6(60):73–8.

14. Harini R, Juwitasari J, Setyowati L, Oktavia RD. Post-caesarean section pain and quality of sleep among mothers who delivered by caesarean section under spinal anesthesia. Post-caesarean section pain and quality of sleep among mothers who delivered by caesarean section under spinal anesthesia. 2020;3(2):110–6.

15. Jadon A, Bagai R. Effective pain relief after caesarean section; Are we on the right path or still on the crossroad. Journal of Obstetric Anaesthesia and Critical Care. 2019;9(1):3.

16. Yang MMH, Hartley RL, Leung AA, Ronksley PE, Jetté N, Casha S, et al. Preoperative predictors of poor acute postoperative pain control: a systematic review and meta-analysis. BMJ Open. 2019;9(4):e025091.

17. Sargin MA, Yassa M, Turunc M, Karadogan FO, Aydin S, Tug N. Abdominal irrigation during cesarean section: is it beneficial for the control of postoperative pain and gastrointestinal disturbance? A randomized controlled, double-blind trial. Int J Clin Exp. 2016;9(2):3416–24.

18. Elsaid RM, Namrouti AS, Samara AM, Sadaqa W, Zyoud SH. Assessment of pain and postoperative nausea and vomiting and their association in the early postoperative period: an observational study from Palestine. BMC Surgery.

2021;21(1):177.
19. van Boekel RLM, Bronkhorst EM, Vloet L, Steegers MAM, Vissers KCP. Identification of preoperative predictors for acute postsurgical pain and for pain at three months after surgery: a prospective observational study. Scientific Reports. 2021;11(1):16459.
20. Thom H, Norman G, Welton NJ, Crosbie EJ, Blazeby J, Dumville JC. Intra-Cavity Lavage and Wound Irrigation for Prevention of Surgical Site Infection: Systematic Review and Network Meta-Analysis. Surgical Infections. 2020;22(2):144–67.
21. Mangold T, Hamilton EK, Johnson HB, Perez R. Standardising intraoperative irrigation with 0.05% chlorhexidine gluconate in caesarean delivery to reduce surgical site infections: A single institution experience. Journal of Perioperative Practice. 2019;30(1–2):24–33.

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