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Original Research Paper

The use of ERACS method for accelerating conscious recovery time in cesarean section patients

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Abstract

Enhanced Recovery After Caesarean Section (ERACS) is a method that is currently being widely developed, one of which is for mothers undergoing cesarean sections. The use of ERACS enables postpartum recovery time to be faster, thus improving mobility, accelerating labor recovery, and providing other benefits such as enhancing the quality of care and reducing the use of consumables. However, not all mothers and hospitals use ERACS. The purpose of this study is to determine the difference in conscious recovery time in the recovery room between patients post-surgery using the ERACS method and the conventional method at RSUD Soerojo. This comparative study uses a quantitative approach, quasi-experimental, with a control group design. The population includes all post-cesarean section patients using spinal anesthesia, with the sample being post-cesarean section patients using ERACS and the conventional method. There is a significant difference between spinal anesthesia techniques with ERACS and the conventional method in terms of accelerating the recovery time of post-cesarean section patients in the recovery room, with a significance value of 0.000. The use of ERACS should be considered for all mothers undergoing cesarean sections in all hospitals if there are no contraindications

Keywords: ERACS; conventional; regaining consciousness; sectio caesarea

1. Introduction

Nowadays, the rate of deliveries by cesarean section has increased dramatically in several countries worldwide, including Indonesia (Adiningrum, 2022). WHO even states that the rate of cesarean section deliveries has exceeded the recommended limit of 10%-15% (Pan et al., 2021). The Caribbean and Latin America regions are the highest contributors with a rate of 40.5%, followed by Europe (25%), Asia (19.2%), and Africa (7.3%) (Elly, 2022). In Indonesia, the rate of cesarean section deliveries shows a relatively high prevalence of 17.6%, with the highest rate in Jakarta (31.3%) and the lowest in Papua (6.7%) (Riskesdas, 2018). The high rate of cesarean sections causes several problems, including pain, anxiety, prolonged immobilization, and extended recovery time in the recovery room (Alhogbi et al., 2020). In line with this, anesthesia techniques in the management of cesarean section patients have continuously evolved, including the use of the ERACS method (Kutlu, 2023). Besides the problem of pain, other issues such as high costs due to extended hospital stays are also frequently reported (Lavand'homme, 2019).

Enhanced Recovery After Caesarean Section (ERACS) is an advancement results in anesthesia techniques for cesarean sections introduced since 2016, encompassing stages of pre-operative, intra-operative, and post-operative care optimization (Millizia et al., 2023). The purposes of the ERACS method are faster mobility, shorter post-operative recovery, accelerated labor recovery, and additional benefits such as improved quality of care, reduced use of consumables, and decreased opioid exposure

(Fajarnia et al., 2023; Iverson, 2023; Nayarani, 2023; Latief, 2023). Several studies report that the use of the ERACS method significantly reduces maternal postoperative pain, minimizes side effects of anesthesia such as dizziness or nausea, and shortens the duration of hospital stays, thereby optimizing post-operative recovery for mothers after childbirth (Kleiman et al., 2019; Fay et al., 2019; Wrench et al., 2015). Additional reported benefits of this method include aiding mothers in early mobilization, which increases the success rate of exclusive breastfeeding compared to mothers who undergo conventional methods (Bollag et al., 2020; Sultan et al., 2020; Teigen et al., 2019; Chiao et al., 2022).

Although the various advantages of using ERACS have been widely reported, not all cesarean section mothers can undergo the ERACS method (Mirzanie et al., 2020). Mothers with severe anemia, uncontrolled diabetes, high anxiety disorders, and obesity cannot undergo cesarean sections with the ERACS method, thus requiring other anesthesia techniques such as conventional spinal anesthesia, epidural, block, or even general anesthesia (Aryanto et al., 2022; Nisak et al., 2023; Tika et al., 2021). Essentially, the ERACS method aims to achieve faster recovery, allowing patients to recover more quickly, reducing the length of hospital stays, and enabling early interaction with their babies (Prastio, 2023). Through the use of the ERACS method, mothers post-cesarean can sit comfortably after 2 hours, perform light activities such as urination, and walk independently (Purnaningrum, 2023; Raharja, 2023). Conscious recovery time in the recovery room is crucial for the success of early mobilization of mothers post-delivery (Gupta et al., 2022). Based on this background, this research aims to determine the impact and duration of conscious recovery time for post-cesarean section patients with spinal anesthesia and ERACS in the recovery room.

2. Research Methods

This study uses a comparative method with a quantitative approach**.** Researchers will compare whether there is a difference between the ERACS method and the conventional method in accelerating conscious recovery time in the Recovery Room. The research design is quasi-experimental with a design with a control group. The intervention group is given spinal anesthesia and uses the ERACS method, while the control group is given spinal anesthesia and uses the conventional method. The frequency of spinal anesthesia in each group is the same, i.e., once during the operation, according to the scheduled operation time. The researchers determined the data collection limit during the patient's conscious recovery time in the recovery room.

The total number of respondents obtained with total sampling was 33 people**.** Respondents were randomly divided into 2 groups: the control group (post-cesarean section with conventional anesthesia technique) consisting of 15 respondents, and the intervention group (post-cesarean section with ERACS anesthesia technique) consisting of 18 respondents. Some respondents dropped out (respondents did not go through the recovery room and death on table), including 1 respondent from the control group and 1 respondent from the intervention group, and some samples were excluded (respondents withdrew, used general anesthesia, used spinal anesthesia other than ERACS and Conventional methods) with 1 respondent from the intervention group. Therefore, the final sample obtained and analyzed in this study was 30 respondents, consisting of 14 samples from the control group and 16 samples from the intervention group.

The instrument used in this study is an observation sheet employed to determine the Bromage score, which is used to assess whether the patient is fully conscious and whether they are ready to be transferred to the inpatient ward. Primary data were collected through direct observation and measurement of the respondents, while secondary data were obtained from the respondents' Electronic Medical Records (EMR). The normality test in this study was conducted using the Shapiro-Wilk test due to the small sample size of 30 respondents, consisting of 14 control group respondents and 16 intervention group respondents. The statistical hypothesis test was performed using the Mann-Whitney

test. Ethical clearance for this study was granted by Soerojo Hospital with the approval number DP.04.03/D.XXXVI.12/17/2024.

3. Results and Discussion

3.1. Characteristics of Respondents

The sample size obtained and processed in this study is 30 samples, consisting of 14 samples (46.66%) from the control group, which includes post-cesarean section respondents using conventional anesthesia techniques, and 16 samples (53.33%) from the intervention group (post-cesarean section respondents using ERACS anesthesia techniques), with the following respondent characteristics:

Table 1. Respondent Characteristics

Variable	Intervention Group		Control Group	
	Frequency	**Percent** (%)	**Frequency**	**Percent** (%)
Age				
11 - 20	3	18.75	1	7.14
21 - 30	5	31.25	5	35.71
31 - 40	5	31.25	4	28.57
41 - 50	3	18.75	4	28.57
Total	**16**	**100**	**14**	**100**
Body weight				
60 Kg – 80 Kg	9	56.25	6	42.85
81 Kg – 100 Kg	7	43.75	8	57.14
Total	**16**	**100**	**14**	**100**
Pregnancy History				
First Pregnancy	5	31.25	2	14.28
Second Pregnancy	6	37.50	6	42.85
More than 3 pregnancies	5	31.25	6	42.85
Total	**16**	**100**	**14**	**100**
History of Cesarian section				
Ever Had a Cesarian	6	37.5	9	64.28
Never Had a Cesarion	10	62.5	5	35.71
Total	**16**	**100**	**14**	**100**
Case Classification				
Emergency	6	37.5	6	42.85
Elective	10	62.5	8	57.14
Total	**16**	**100**	**14**	**100**
Pre-Anesthesia Physical Status Criteria				
Pre-Anesthesia Physical Status I	10	62.5	5	35.71
Pre-Anesthesia Physical Status II	6	37.5	9	64.28
Total	**16**	**100**	**14**	**100**

Source: Primary Data, 2024

The results of the study show that all respondents were female, aged 21 - 40 years, with a total of 19 respondents (63.33%) in this age range, which is considered the productive age group. There were no elderly respondents (>60 years) included in this study. This finding aligns with the theories by Apriliana et al. (2023) and Sidharti (2023), which suggest that children, adolescents, and adults tend to recover more quickly after anesthesia due to the more effective circulation and stability of their general condition. While elderly individuals are not contraindicated for anesthesia procedures, anesthesia requires effective ventilation, both natural and mechanical. In older adults, circulation can

often be prolonged, and their circulatory ability to compensate for the vasodilation caused by anesthesia can lead to hypotension, which also affects the stability of their general condition during the postoperative recovery period.

The classification of age groups is based on the theory by Alhogbi et al. (2020) in Mansjoer (2022) regarding the concept of cesarean section risk classification according to age range. It explains that the highest or extreme risk is observed in individuals aged 11-20 years who have reached menarche, and in those over 50 years who have not yet reached menopause. Meanwhile, the low-risk group is composed of individuals aged 21-30 years, the moderate-risk group includes those aged 31-40 years, and the high-risk group includes individuals aged 41-50 years. In this study, there were no respondents over 50 years of age, and the age range of 11-20 years started from respondents aged 17.

The age considered physiologically safe is between 20 and 35 years. Age is one of the risk factors for maternal childbirth. Risks such as bleeding or other complications tend to occur more frequently in mothers younger than 20 years or older than 35 years (Rusmawati et al., 2024). In some cases, aside from cesarean section, age also influences the prognosis of procedures, where older and weaker patients are at higher risk for complications after major abdominal surgery (British Geriatrics Society). Therefore, the ERAS (Enhanced Recovery After Surgery) protocol has a positive impact on surgical outcomes for this patient group. The ERAS protocol minimizes stress reactions on various organ systems that may already be compromised in elderly patients. A similar approach can also be applied to elderly patients undergoing neurosurgery, which likely holds true for obstetric and gynecological surgery patients using the ERACS (Enhanced Recovery After Cesarean Section) method (Ljungqvist & Hubner, 2018).

The body weight of the respondents in this study was predominantly in the range of 60 kg – 80 kg, with 9 respondents (56.25%) from the 16 respondents in the intervention group, and 81 kg – 100 kg with 8 respondents (57.14%) from the 14 respondents in the control group. This factor influences the duration of recovery time after anesthesia, as described in the theory by Mangku & Senapathi (2020), which states that body weight correlates strongly with body fat mass. As a result, the delivery of anesthetic drugs takes longer, and higher doses are required during anesthesia, leading to a longer post-anesthesia recovery process.

Additionally, it is important to identify obese patients, who are at a higher risk of developing medical complications that significantly impact post-anesthesia recovery after surgery (Ratnasari & Yatsi, 2022). One contraindication for the use of spinal anesthesia is in obese parturients or those with a body mass index (BMI) below normal, as there is concern about the potential for high spinal anesthesia block, which may lead to hypotension and intraoperative nausea and vomiting. Other studies have mentioned that the time to reach an adequate sensory level for surgery correlates with height and is inversely related to body weight (She et al., 2021; Ioannidis et al., 2018).

The pregnancy history of the respondents in this study shows that 7 respondents (23.33%) from the total of 30 respondents were pregnant for the first time and had no prior pregnancy history, while 23 respondents (76.67%) had previous pregnancies. This data indicates that the respondents in this study align with the findings of Adikusumah et al. (2023), which state that over 65% of cesarean section indications are due to a history of previous pregnancies, either due to prior cesarean section, poor pregnancy outcomes, obstetric history, or other risk factors.

A history of pregnancy provides different experiences for each individual, which in turn affects the patient's hemodynamic status during childbirth. This has implications for the effects of anesthesia both intraoperatively and postoperatively, depending on whether the patient's hemodynamics are stable, as influenced by previous surgical experiences or the lack thereof (Ratnasari, 2023). This is also consistent with previous research by Jaya (2022), which states that the hemodynamic, pharmacodynamic, and pharmacokinetic effects of anesthetic agents are quicker in patients with prior

pregnancy and surgery experiences. This is because the anxiety is lighter due to the preparedness from past experiences, leading to a lower need for lipophilic drugs such as opioids, benzodiazepines, muscle relaxants, and anesthetic doses, compared to patients undergoing surgery or pregnancy for the first time.

In this study, 15 respondents (50%) out of the total 30 respondents had a history of cesarean section surgery, and 12 respondents (40%) of the total 30 respondents had emergency cases. The history of previous surgeries and case classification influence the duration of recovery after anesthesia. This aligns with the theory of Permatasari (2021), which states that surgery involving emergency cases and a history of previous surgeries can have different effects due to the patient's dynamic status. Surgery involving blood loss greater than 15%–20% of the total normal blood volume affects organ perfusion, oxygen transport, and circulation. Similarly, patients with a history of previous surgery are at risk of developing adhesions in the tissues, which may trigger bleeding (Soeparman et al., 2020). Fluid loss can also lead to prolonged recovery of bodily functions after anesthesia (Sjamsuhidajat & Jong, 2020).

In this study, the majority of respondents had a pre-anesthesia physical status of Status I, with 15 respondents (50%) out of a total of 30 respondents. For Status II, there were also 15 respondents (50%) out of the total 30 respondents, while Status III to V were not represented in this study. The pre-anesthesia physical status determines the type of anesthesia to be administered and influences the post-anesthesia recovery time, which is related to the use of anesthetic drugs in accordance with the pre-anesthesia physical status. The pre-anesthesia physical status classification system is used to assess the patient's health before surgery to ensure the appropriate anesthesia management (Plutzer, 2021).

Status I indicates a normal patient with no organ diseases. Status II indicates a patient with mild to moderate systemic disease without functional disturbances. This classification directly correlates with the recovery time post-anesthesia. The higher the anesthesia score, the longer the post-anesthesia recovery time (Alhogbi et al., 2020).

The Duration of Consciousness Recovery Time of Postoperative Cesarean Section Patients with Spinal Anesthesia Using the ERACS and Conventional Methods in the Recovery Room.

Table 2. Length of Concious Recovery

Time	Intervention Group		Group Control	
	Frequency	Percent (%)	Frequency	Percent (%)
10 minutes	2	12.5		
15 minutes	6	37.5		
30 minutes	8	50	2	14.28
45 minutes			5	35.71
60 minutes			7	50
90 minutes				
120 minutes				
Total	16	100	14	100

Source: Primary Data, 2024

Table 3. *Bromage score*

Bromage score	Intervention Group		Control Group	
	Frequency	Percent (%)	Frequency	Percent (%)
0	7	43.75	1	7.14
1	6	37.5	7	50
2	3	18.75	6	42.85
3				
Total	16	100	14	100

Source: Primary Data, 2024

The purpose of this study is to compare the duration of consciousness recovery time for postoperative cesarean section patients with spinal anesthesia using the ERACS method and the conventional method in the recovery room at Soerojo Hospital's operating room. The time required for patients to recover in the recovery room depends on several factors, including the duration and type of surgery, the classification of the surgical case, a history of previous surgeries, anesthesia techniques, types and doses of medications administered, age, weight, and the general condition of the patient both pre- and post-anesthesia (Zuleikha et al., 2022).

Both groups were assessed using the Bromage score, which records the patient's hemodynamic status, general condition, and motor activity post-surgery after anesthesia while in the recovery room. The transfer of patients to the inpatient room is based on their Bromage score. In this study, all respondents transferred to the inpatient room achieved a minimum Bromage score of 2. For the group with spinal anesthesia using the ERACS method, the Bromage scores were as follows: score 0 in 7 patients (43.75%), score 1 in 6 patients (37.5%), and score 2 in 3 patients (18.75%). Meanwhile, in the conventional spinal anesthesia group, the Bromage scores were: score 0 in 1 patient (7.14%), score 1 in 7 patients (50%), and score 2 in 6 patients (42.85%).

The Bromage score is a criteria system used in the recovery room to assess the motor movement of patients after anesthesia (Utami & Sartika, 2021). The criteria are graded from 0 to 3, with each grade representing different levels of motor movement, and the final score is used as a criterion for transferring the patient from the recovery room (Arif & Etlidawati, 2021). A patient can be transferred from the recovery room when the Bromage score reaches 0, which indicates that the patient is fully conscious and their condition is stable. The minimum score for transfer is 2 (Ali, 2023).

In this study, the results showed a difference in the recovery time between the ERACS anesthesia method and the conventional method. In the postoperative cesarean section group with spinal anesthesia using the ERACS method, the recovery time in the recovery room was as follows: the quickest recovery time of 10 minutes occurred in 2 respondents (12.5%), the longest recovery time was 30 minutes in 8 respondents (50%), and 15 minutes in 6 respondents (37.5%). Meanwhile, in the postoperative cesarean section group with spinal anesthesia using the conventional method, the recovery time was: the quickest recovery time of 30 minutes in 2 respondents (14.28%), the longest recovery time of 60 minutes in 7 respondents (50%), and 45 minutes in 5 respondents (35.71%).

These results are consistent with the study by Rusmawati et al. (2024), which found that the average time to reach a Bromage score of 0 after spinal anesthesia using the ERACS method was 30 minutes, which was faster than the non-spinal ERACS method (Rusmawati et al., 2024).

The determination of the type of anesthesia to be used is based on the pre-anesthesia physical status, medical history, previous surgeries, weight, age, and the type of surgery to be performed (Gwinnutt, 2023). In this study, all respondents underwent spinal anesthesia, with 16 respondents using the ERACS method and 14 respondents using the conventional method. The goal of ERACS is to optimize outcomes such as patient comfort and safety, accelerate recovery, minimize the risk of healthcare-associated infections (HAIs) and other complications, and reduce the length of hospital stays (Lara, 2022).

However, not all patients are eligible for cesarean section under the ERACS anesthesia method. Certain conditions are contraindications for ERACS, such as severe anemia, uncontrolled diabetes, high anxiety disorders, advanced age, previous surgery history, and obesity. In these cases, alternative anesthesia techniques, such as conventional spinal anesthesia, epidural anesthesia, or even general anesthesia, may be used (Aryanto et al., 2022). These factors can affect the recovery time.

Nevertheless, the overall results of the study indicate that ERACS is strongly associated with accelerated recovery times for patients following cesarean surgery. The hypothesis test using the

Mann-Whitney test yielded a p-value (Asymp. Sig. 2-tailed) of 0.000 or < 0.05, meaning the null hypothesis is rejected, and the alternative hypothesis (Ha) is accepted. This shows a significant difference between spinal anesthesia techniques using the ERACS method and the conventional method in terms of accelerating recovery times in the recovery room at Soerojo Hospital's operating room.

This implies that the ERACS method of spinal anesthesia is more effective in accelerating the recovery time post-cesarean section compared to the conventional method. Therefore, it is recommended that ERACS be considered as the standard method for patients undergoing cesarean section, as long as there are no contraindications.

4. Conclusion

There is a significant difference between the spinal anesthesia techniques using the ERACS method and the conventional method in terms of accelerating recovery time for patients after cesarean section in the recovery room at Soerojo Hospital's operating room. The use of the ERACS method for spinal anesthesia is more effective in accelerating recovery time post-cesarean section compared to the conventional method. This study found that the recovery time for the ERACS anesthesia group was faster compared to the conventional method.

Future research should be more comprehensive in examining the effects of the ERACS method, considering its broader impact on post-cesarean section patients, beyond just recovery time. This could include factors such as early mobilization, wound healing, exclusive breastfeeding, length of hospital stay, and other potential outcomes. It would be valuable to conduct these studies with a larger number of respondents and across more diverse research locations.

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