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DESCRIPTION OF HYPOTENSION IN CESAREAN SECTION PATIENTS UNDER SPINAL ANESTHESIA USING CONVENTIONAL AND ENHANCED RECOVERY AFTER SURGERY METHODS

Eko Yulianto, Dwi Novitasari*, Asmat Burhan
Bachelor of Nursing Anesthesiology Program, Faculty of Health
Universitas Harapan Bangsa, Jl. Raden Patah No.100, Kedunglongsir, Ledug, Banyumas, Central Java 53182 Indonesia
*dwinovitasari@uhb.ac.id

ABSTRACT

Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative management aimed at faster recovery from major surgery, reducing the risk of complications, and shortening the length of stay compared to conventional perioperative methods. Hypotension is a side effect of a cesarean section with spinal anesthesia. This study aims to describe hypotension in patients undergoing cesarean sections with conventional spinal anesthesia methods and the Enhanced Recovery After Surgery (ERAS) method. This study used a quantitative research method with a descriptive design and a cross-sectional approach. The sampling technique was purposive sampling with a total of 40 cesarean section patients, consisting of 20 respondents in the conventional spinal anesthesia group and 20 respondents in the ERAS spinal anesthesia group. Blood pressure measurements were taken before and after spinal anesthesia using a bedside monitor. The data obtained included age and blood pressure, which were analyzed using statistics. The results showed that in the conventional spinal anesthesia group, 15 respondents experienced hypotension (75%), and 5 respondents did not experience hypotension (25%). In the Enhanced Recovery After Surgery (ERAS) spinal anesthesia group, 7 respondents experienced hypotension (35%), and 13 respondents did not experience hypotension (65%).

Keywords: eras method; hypotension; spinal anesthesia

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INTRODUCTION

A cesarean section is defined as the delivery of a fetus through an incision in the abdominal and uterine walls. More than 85% of cesarean sections are performed for four main reasons: previous cesarean delivery, dystocia, fetal distress, or abnormal fetal presentation (Cunningham et al., 2018). The use of cesarean sections has been increasing globally and now accounts for more than 21% of all births (World Health Organization, 2021). The National Health Research Report (Riskesdas) in 2018 stated that the proportion of cesarean section deliveries among women aged 10-54 years reached 17.6% of all births in Indonesia. The province of DKI Jakarta recorded the highest rate of cesarean sections at 31.1%, while the lowest was in Papua Province at 6.7%. The Central Java Province had a cesarean section delivery rate of 17.1% (Kemenkes RI, 2019). A cesarean section commonly uses regional anesthesia as the primary choice. Spinal anesthesia is a type of neuraxial block that entails injecting a local anesthetic or adjuvant into the subarachnoid space. When having a cesarean section, neuraxial spinal anesthesia can help lower the risk of pulmonary aspiration and intubation failure, which can lead to illness and death during the surgery. It can be used alone or with general anesthesia. In developing countries with limited resources, spinal anesthesia is the primary choice because it is affordable, relatively safer, and easier to perform (Rehatta et

al., 2019).

Local anesthetics used in spinal anesthesia include lidocaine 5%, tetracaine 0.5%, bupivacaine 0.5-0.75%, ropivacaine 0.5-0.75%, and chloroprocaine 2-3%. Spinal anesthesia generally uses hyperbaric local anesthetics compared to isobaric and hypobaric (Butterworth IV et al., 2022). The side effects of spinal analgesia are generally associated with sympathetic nerve blockade, namely hypotension (Pramono et al., 2022). Spinal anesthesia and neuroaxial block both affect the heart by widening veins, which causes blood to pool in the viscera and lower limbs. This causes a decrease in circulating blood volume and cardiac output. Arterial vasodilation leads to a decrease in systemic resistance, resulting in hypotension and decreased cardiac output (Rehatta et al., 2019).Hypotension is a decrease in systolic blood pressure by more than 20%–30% from baseline measurements, or systolic blood pressure lower than 100 mmHg. Uncorrected hypotension can lead to decreased uterine perfusion. Severe and prolonged hypotension can result in fetal hypoxia and acidosis (Rehatta et al., 2019). Severe hypotension can have adverse effects on the mother, including changes in consciousness, pulmonary aspiration, apnea, and heart failure (Chestnut et al., 2020).

Conventional operative management places a premium on prolonged patient rest and gastrointestinal tract function. Conventional postoperative management is considered to keep patients in the hospital longer, causing dependency on medications and special assistance such as parenteral analgesic needs, intravenous fluid administration, and bed rest. The Enhanced Recovery After Surgery (ERAS) method is a perioperative stage aimed at improving the patient's ability to undergo major surgery through a multidisciplinary team approach that focuses on reducing stress and accelerating functional recovery. The ERAS method aims for faster recovery from major surgery, avoiding residual symptoms of conventional postoperative care, reducing the risk of complications, and shortening the hospital stay, thus reducing the burden on healthcare services (Bernolian et al., 2021). ERAS is a method for faster recovery after surgery that includes fasting, carbohydrate supplementation, antimicrobial prophylaxis, and skin preparation/vaginal preparation to lower the risk of infection before the surgery (Bernolian et al., 2021). The intraoperative stage includes choosing regional anesthesia as the preferred method for cesarean delivery, preventing bleeding during surgery, and fluid balance (Ljungqvist et al., 2020). Postoperative components include preventing nausea and vomiting, early mobilization, perioperative nutritional care/early feeding, analgesia, glucose control, thromboembolism prevention, and urinary drainage management (Bernolian et al., 2021).

The choice of local anesthetic drugs in conventional spinal anesthesia for cesarean section surgery includes tetracaine 10-15 mg, bupivacaine 10-15 mg, and lidocaine 75-100 mg. Conventional spinal anesthesia has disadvantages, such as a rapid onset of hypotension in 50–80% of cases, even after a pre-load of 20 ml/kg (Soenarjo et al., 2013). The intraoperative cesarean section procedure with ERAS includes preventing hypotension induced by spinal anesthesia (Kementrian Kesehatan Republik Indonesia, 2022). Hypotension complications can be addressed by reducing the spinal anesthesia dose (Bisri et al., 2021). The implementation of ERAS spinal anesthesia for cesarean sections essentially uses a low-dose technique (Sulistyawan et al., 2020). Patients receive spinal anesthesia with low-dose bupivacaine 0.5%, fentanyl, and intrathecal morphine using a 27 G needle with an introducer (Tika et al., 2022). A study of 8,226 women identified cesarean section surgery with spinal anesthesia. The study used hyperbaric bupivacaine <10 mg vs. hyperbaric bupivacaine ≥10 mg to assess the primary outcome using multivariable logistic regression. The main result was

that hypotension happened with all doses of hyperbaric bupivacaine. However, hypotension with spinal anesthesia was significantly linked to a dose of 10 mg or more, even after taking into account possible confounders (Weiniger et al., 2021). A preliminary study in November 2023 at Prof. Dr. Margono Soekarjo Purwokerto Hospital found that 15 patients undergoing cesarean sections with conventional spinal anesthesia experienced hypotension in 12 patients, while 10 patients undergoing the Enhanced Recovery After Surgery (ERAS) method experienced hypotension in 2 patients. Tujuan penelitian ini adalah untuk mengetahui gambaran hipotensi pada pasien seksio sesarea intra anestesi spinal metode konvensional dan Enhanced Recovery After Surgery (ERAS). Hasil penelitian diharapkan dapat digunakan sebagai referensi mencegah terjadinya hipotensi dengan anestesi spinal pada pembedahan seksio sesarea.

METHOD

This study employs a quantitative research methodology with a descriptive design and a cross-sectional approach. The study's goal is to describe low blood pressure in women who have had a cesarean section and are receiving spinal anesthesia using both standard methods and the Enhanced Recovery After Surgery (ERAS) method at the Central Surgery Unit of Prof. Dr. Margono Soekarjo Purwokerto Hospital. The study was conducted from April 1, 2024, to April 30, 2024. This research has received research permission through a research permit letter numbered 420/02843 signed by the Director of Prof. Dr. Margono Soekarjo Purwokerto Hospital, and has passed the ethical clearance through an ethical clearance approval letter numbered 420/02840 signed by the Chairman of the Health Research Ethics Committee of Prof. Dr. Margono Soekarjo Purwokerto Hospital.The sampling technique used is purposive sampling. Samples were taken from the entire population of elective cesarean section patients using spinal anesthesia who met the inclusion criteria: elective cesarean section patients, patients agreeing to undergo spinal anesthesia, ASA 2 physical status, aged 17-45 years. Exclusion criteria: cesarean section patients who have converted from spinal anesthesia to general anesthesia, contraindications to spinal anesthesia, severe preeclampsia/eclampsia, ASA 3 and ASA 4 physical status, allergy to local anesthetics, and patients who refuse to participate.

Respondents who met the inclusion criteria were given a verbal explanation before the research. Patients willing to be research samples were asked to sign informed consent and had the right to withdraw. Data collection was conducted by observing blood pressure using a bedside monitor before and after spinal anesthesia. Spinal anesthesia was performed by an anesthesiologist using a dose determined by the anesthesiologist at Prof. Dr. Margono Soekarjo Purwokerto Hospital. In traditional spinal anesthesia, a local anesthetic dose of 10 mg of hyperbaric bupivacaine 0.5% and 25 mcg of fentanyl was used. The Enhanced Recovery After Surgery (ERAS) method, on the other hand, used a low dose of 7.5 mg of hyperbaric bupivacaine 0.5% plus 100 mcg of morphine and 25 mcg of fentanyl. This information was written on the anesthesia record sheet and kept in the medical record.The researcher measured systolic blood pressure before conventional spinal anesthesia or the Enhanced Recovery After Surgery (ERAS) method and then recorded it in the observation sheet. The researcher measured systolic blood pressure within a 5-10 minute interval after spinal anesthesia using the conventional method or the ERAS method. The researcher entered the systolic blood pressure measurement values into the observation sheet. Systolic blood pressure categories: < 100 mmHg indicates hypotension, whereas systolic blood pressure $\geq$ 100 mmHg indicates no hypotension. The collected data was re-examined to be tabulated and entered into a master table using Microsoft Office 2010. Data was analyzed using descriptive

statistics. The univariate data analysis used in this study is presented in the form of frequency and percentage distribution tables.

RESULT

Table 1.
Characteristics of Research Respondents

Characteristics	f	%
Age		
Late Adolescence (17-25 years)	6	15
Early Adulthood (26-35 years)	19	47.5
Late Adulthood (36-45 years)	15	37.5
Type of Spinal Anesthesia		
Conventional Method	20	50
ERAS Method	20	50

According to the table above, 19 respondents are aged 26-35 years or categorized as early adulthood (47.5%). Respondents using the conventional method were 20 people (50%), and those using the ERAS method were 20 people (50%).

Table 2.
Frequency Distribution of Hypotension During Spinal Anesthesia with the Conventional Method and Enhanced Recovery After Surgery (ERAS) Method

Type of Spinal Anesthesia	Hypotension	No Hypotension	Total
ERAS Method	7 (35%)	13 (65%)	20 (100%)
Conventional Method	15 (75%)	5 (25%)	20 (100%)

According to the table above, 15 respondents in the conventional spinal anesthesia group experienced hypotension (75%), while 5 respondents did not (25%). Also, according to Table 2, 7 respondents in the ERAS spinal anesthesia group experienced hypotension (35%), while 13 respondents did not (65%).

DISCUSSION

Age distribution of respondents

This study was dominated by respondents aged 26-35 years/early adulthood, totaling 19 respondents (47.5%). This study agrees with one that looked at hypotension (low blood pressure) in cesarean section patients who were given spinal anesthesia with bupivacaine. That study found that most of the patients were between the ages of 20 and 35 and had spinal anesthesia (Tanambel et al., 2017). According to a study about the link between age and the risk of hypotension in people who had spinal anesthesia, the age group most likely to use spinal anesthesia techniques was early adulthood (26–35 years), with 40 respondents (42.5%). Most of the patients in that study were women having a cesarean section (Zulfakhrizal et al., 2023).

Description of Hypotension During Spinal Anesthesia

Hypotension is defined as a decrease in systolic blood pressure >20% or systolic blood pressure <100 mmHg (Rehatta *et al*., 2019). Symptoms and signs of hypotension during spinal anesthesia include nausea, vomiting, dizziness, and shortness of breath (Gropper et al., 2020). Nausea, with or without vomiting, is often a sign of hypotension (Pramono *et al*., 2022). The conventional spinal anesthesia group consisted of 20 respondents, with 15 experiencing hypotension (75%), and 5 not experiencing hypotension (25%). The dose used in the conventional group was hyperbaric bupivacaine 0.5% 10 mg with fentanyl 25 mcg

adjuvant. This is consistent with a study comparing the incidence of hypotension with spinal anesthesia using the ERAS and conventional methods in cesarean section surgery, which stated that the systolic blood pressure results after spinal anesthesia in the conventional group showed that 15 respondents experienced hypotension (100%), or all respondents experienced hypotension (Wicaksono et al., 2022).This study agrees with one that looked at the link between hyperbaric bupivacaine dosage and low blood pressure in mothers. That study found that low blood pressure was more common in patients who were under spinal anesthesia and had hyperbaric bupivacaine doses of 10 mg or more (Weiniger *et al*., 2021). The incidence of hypotension is caused by several factors, one of which is the drug dosage (Tanambel et al., 2017). The cardiovascular effects of spinal anesthesia and neuroaxial block cause venous vasodilation, resulting in blood pooling in the viscera and lower extremities. This causes a decrease in circulating blood volume and cardiac output. Arterial vasodilation leads to a decrease in systemic resistance, resulting in hypotension and decreased cardiac output (Rehatta *et al*., 2019).

The side effects of spinal anesthesia are related to sympathetic nerve blockade, where the height of the blockade is associated with hypotension. The height of this blockade is related to the administration of excessive agent doses or standard doses in certain patients, such as pregnant women (Pramono *et al*., 2022). Hypotension is associated with a decreased heart rate and contractility that is proportional to the level of sympathectomy. Vasomotor tone originates from thoracic 5-lumbar 2 sympathetic fibers. A block at this level causes venous vasodilation, venous pooling, reduced venous return and stroke volume, and arterial vasodilation, all of which can reduce systemic vascular resistance. The compensation for arterial vasodilation is vasoconstriction at levels above the block, vasoconstriction compensates for arterial vasodilation. A high sympathetic block not only eliminates compensation but also blocks cardiac accelerator fibers in thoracic 1-thoracic 4, leading to hypotension and bradycardia (also known as the Bezold-Jarisch Reflex) (Mahendra, 2022).

The ERAS spinal anesthesia group, consisting of 20 respondents, had 7 respondents experiencing hypotension (35%), and 13 respondents not experiencing hypotension (65%). It fits with a study that looked at the risk of hypotension during spinal anesthesia using the ERAS and traditional methods in cesarean section surgery. The study found that 5 people in the ERAS group had hypotension (33.3%) after spinal anesthesia, while 10 people in the conventional methods group did not have hypotension (66.7%) (Wicaksono et al., 2022). The dose used in the ERAS group in this study was hyperbaric bupivacaine 0.5% 7.5 mg with fentanyl 25 mcg + morphine 100 mcg adjuvant. This is consistent with a study comparing low-dose bupivacaine and fentanyl with conventional doses of hyperbaric bupivacaine, which stated that blood pressure decreased significantly with a reduction of >25% from baseline blood pressure in the conventional group receiving bupivacaine with 10 mg compared to the low-dose group receiving bupivacaine with 7.5 mg and fentanyl 25 mcg adjuvant. Bupivacaine 7.5 mg hyperbaric bupivacaine and fentanyl 25 mcg adjuvant in spinal anesthesia for elective cesarean section patients showed better hemodynamic stability (Venkata et al., 2015).

The intraoperative cesarean section procedure with ERAS includes preventing hypotension induced by spinal anesthesia (Kementrian Kesehatan Republik Indonesia, 2022). Hypotension complications can be addressed by reducing the spinal anesthesia dose (Bisri et al., 2021). The use of low-dose spinal anesthesia with bupivacaine and low-dose opioids, such as bupivacaine 3.5 mg, 5 mg, and 6.5 mg with fentanyl 25 mcg adjuvant, is associated with a lower incidence

of hypotension compared to high doses, namely bupivacaine 9 mg, 9.5 mg, and 10 mg with the same adjuvant dose (Chestnut *et al*., 2020).

CONCLUSION

This study was dominated by respondents aged 26-35 years / early adulthood, totaling 19 respondents (47.5%). The conventional spinal anesthesia group had 15 respondents experiencing hypotension (75%), and 5 respondents not experiencing hypotension (25%). The Enhanced Recovery After Surgery (ERAS) spinal anesthesia group had 7 respondents experiencing hypotension (35%) and 13 respondents not experiencing hypotension (65%).

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