

Overview of Intraoperative Hypotension Incidence in Sectio Caesarea Patients with Spinal Anesthesia in the Operating Room of RSI Purwokerto

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Abstract

Sectio Caesarea is an increasingly common method of delivery, though it carries inherent risks, particularly intraoperative hypotension due to spinal block anesthesia. This research aims to examine the incidence of intraoperative hypotension in cesarean section patients with spinal block anesthesia at RSI Purwokerto. A descriptive quantitative research design with univariate analysis was employed, utilizing data from hypotension observation sheets of 30 patients. The results revealed that hypotension was most prevalent among the Late Adolescent (17-25 years) and Early Adult (26-35 years) age groups. The incidence of hypotension was highest at the 10th minute after anesthesia administration, affecting 17 patients (56.7%), while incidences at the 5th and 15th minutes were 33.3% and 10%, respectively. These findings emphasize the need for careful blood pressure monitoring during the first 15 minutes post-anesthesia to mitigate risks that could impact both maternal and fetal health. This research offers valuable insights for healthcare providers to enhance care quality by preventing and managing hypotension during cesarean section procedures.

Keywords: Blood Pressure Monitoring, Intraoperative Hypotension, *Sectio Caesarea*, Spinal Anesthesia Block.

INTRODUCTION

In the last decade, the proportion of births by *Sectio Caesarea* has increased rapidly, influenced by various socioeconomic and cultural factors. The procedure is now considered very safe in many regions, almost perfect. This increase in cases is due to the fear of pain during childbirth, ease in scheduling births, and the perception that this method is less traumatic (Luh et al., 2020). According to data from the *World Health Organization* (WHO) in 2021, the number of births using the *cesarean* section method increased in Asian countries. In 2018, the rate of *cesarean section* in the world reached 21% per 1000 births in the world. The birth rate using the *cesarean section* method in Indonesia continued to increase in 2018, with 17.6% of the total births in Indonesia. Based on the 2018 Indonesian Demographic and Health Survey (IDHS), the number of SC deliveries in Indonesia among women aged 10-54 years reached 17.6%. The highest prevalence was in the DKI Jakarta region at 31.3% and the lowest in the Papua region at 6.7%. SC delivery in Central Java province in 2018 ranked 12th nationally with a prevalence of 17.10% based on age group, education, occupation, and residence (Nursing et al., 2024).

Sectio Caesarea (SC) is a surgical procedure through an abdominal and uterine wall incision to remove the fetus, placenta, and amniotic fluid (Ramdan, 2022). *Sectio Caesarea*

surgery cannot be separated from the use of anesthesia, namely spinal block anesthesia (Talebong, 2021). Spinal block anesthesia is a procedure for administering anesthetic drugs to relieve pain in patients undergoing surgery by injecting local anesthetic drugs into the cerebrospinal fluid in the subarachnoid space (Patients & Studies, 2024).

The spinal anesthesia block technique has many advantages, including the rapid effect of drug action, deeper sensory and motor blockade, using simple techniques, minimal influence on the baby, and a small risk of toxicity of anesthetic drugs (Farah, 2023). However, in addition to these advantages, the anesthetic spinal block technique has disadvantages, namely the potential for hypotension after an anesthetic spinal block. Hypotension, a decrease in blood pressure after the anesthetic spinal block, is considered a physiological response. Blood pressure is the force or push of blood against the artery walls as blood is pumped from the heart to the rest of the body. In some cases, a severe decrease in blood pressure can be considered a complication and requires management based on the patient's clinical condition (Ramdan, 2022).

Hypotension can be defined as a decrease in systolic blood pressure of more than 20-30% or as systolic blood pressure of less than 100 mmHg. Hypotension in spinal block anesthesia is caused by sympathetic nerve blockade, which acts on the regulation of smooth muscle tone in blood vessels. The blockade of sympathetic nerve fibers causes vasodilation in the venous blood vessels, resulting in changes in blood volume, especially in the lower extremities and splenic, resulting in a decrease in blood flow back to the heart. The worsening hypotension in the mother will lead to a decrease in consciousness, gastric aspiration into the lungs, respiratory arrest, and cardiac arrest. Thus, hemodynamic control to reduce the occurrence of hypotension during *sectio caesarea* is essential for maternal and fetal safety (Chandraningrum & Laqif, 2022).

The urgency of this research lies in the increasing number of cesarean deliveries, especially in regions with high incidence rates, coupled with the critical need for better management strategies to address intraoperative hypotension. While various studies have explored the general risks associated with cesarean sections, there is limited research specifically focused on the incidence and management of hypotension in patients undergoing spinal block anesthesia during *Sectio Caesarea*. This gap in knowledge highlights the importance of further investigation into this issue, especially in ensuring maternal and fetal well-being during surgery.

The novelty of this research is in its focus on the specific timing of hypotension onset and its correlation with age groups in the context of spinal block anesthesia during *Sectio Caesarea*. By analyzing real-time clinical data, this research provides novel insights into the timing and incidence of hypotension, thus offering a more targeted approach to monitoring and managing this risk. These findings are expected to contribute to the refinement of anesthetic practices and improve maternal and fetal outcomes in cesarean delivery procedures.

Based on the background above, the purpose of this research is to determine the incidence of intraoperative hypotension in *Sectio Caesarea* patients with spinal block anesthesia in the operating room. The benefit of this research is that it provides insight into the mechanism of hypotension in SC patients who get spinal blocks. By understanding

the description of hypotensive events that occur during the procedure, they can be more vigilant and ready to face the situation in the operating room. Another benefit is that by understanding the factors that influence hypotension in SC patients, health institutions can improve the quality of health services, reduce the number of complications, and increase patient satisfaction. This could potentially reduce the duration of care and costs incurred due to more efficient management of complications.

RESEARCH METHOD

Research Design

This research design uses quantitative descriptive research. Quantitative descriptive is statistical analysis used to describe, summarize and analyze quantitative data. Quantitative data is data that can be measured or calculated using numbers, such as age, weight, height, and so on (Aziza, 2023). This research aims to provide an objective description of the incidence of hypotension during caesarean section surgery with spinal anesthesia block, based on data recorded in the hypotension observation sheet in the operating room at RSI Purwokerto.

Place and Time of Research

This research was conducted in the Central Surgical Installation (IBS, *Instalasi Bedah Sentral*) room of RSI Purwokerto from November - December 2024.

Research Subjects (number, inclusion, and exclusion criteria)

Population

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics set by researchers to research and then draw conclusions (Sugiyono, 2020). The population used in this research were patients who underwent *sectio caesarea* surgery at RSI Purwokerto.

Sample

The sample is part of the subject in the population under research, which is selected to represent the population in a representative manner based on certain characteristics or characteristics possessed by the population (Nurdin & Hartati, 2019). In this research, the sampling technique that will be used is Accidental Sampling. According to (Sugiyono, 2020), accidental sampling is a sample selection method based on chance, namely choosing individuals who accidentally meet with researchers and are considered to meet the criteria to be used as data sources (Daengs et al., 2022). So, the sample size needed to represent the total population is 30 respondents.

Inclusion criteria

Inclusion criteria in this research include patients who are willing to become respondents by signing informed consent, patients who will undergo cito surgery and elective *sectio caesarea* at RSI Purwokerto, and patients with ASA I-II status. The exclusion criteria include patients who experience spinal anesthesia failure, so it must be replaced using general anesthesia.

Data Collection Technique

To obtain objective and relevant data, the following data collection methods were used:

1. Primary Data

Primary data is usually obtained through field surveys using any data collection method. This researcher's primary data was collected by the researcher himself and obtained directly from respondents according to the schedule and the research that took place.

2. Secondary Data

Secondary data is data that is collected indirectly from the source. This researcher's secondary data is obtained from sources other than respondents. This researcher's secondary data will be used to support and complement primary data relevant to research needs. In this research, data was collected with secondary data. Data was collected by looking at medical records and patient status at RSI Purwokerto.

Data Analysis

Data analysis in this research used univariate analysis, which is an analysis conducted to evaluate each variable from the results of the research (Denis, 2018). Univariate analysis was presented descriptively by utilizing an observation sheet that contained data about cesarean section patients with spinal anesthesia block and intraoperative blood pressure. The data were then calculated to determine the number of patients who experienced hypotension and its percentage based on the total number of patients.

RESULT AND DISCUSSION

Research Result

Respondent Characteristics by Age

Table 1. Frequency Distribution of Respondent Characteristics by Age

Age	Amount	Presentation
Early Adolescence (12-16 years)	0	0%
Late Adolescence (17-25 years)	20	66.7%
Early Adulthood (26-35 years)	10	33.3%
Late Adulthood (36-45 years)	0	0%
Early Elderly (46-55 years)	0	0%
Late Elderly (56-65 years)	0	0%
Total	30	100%

From table 1. The results obtained most of the respondents in this data came from the **Late Adolescent age group (17-25 years)** and **Early Adulthood (26-35 years)**. This indicates that the majority of patients who experience hypotension due to spinal anesthesia are individuals in the young to early adult age range, who may have certain physiological characteristics that contribute to their body's response to spinal anesthesia.

Respondent characteristics based on blood pressure

Tabel 2. Frequency distribution of respondent characteristics based on intraoperative blood pressure with spinal anesthesia block in November to December 2024 (n=30)

Blood Pressure	Time		
	5 minutes	10 minutes	15 minutes
Hypotension	10 (33.3%)	17 (56.7%)	3 (10.0%)
Normal	20 (33.3%)	13 (21.7%)	27 45.0%)

From table 2. It was found that at 10 minutes after spinal anesthesia, the incidence of hypotension reached its highest point, with most patients experiencing a decrease in blood pressure. This indicates that around that time, the body is more susceptible to a decrease in blood pressure due to the effects of spinal anesthesia. Hypotension that occurs at this time can be caused by various factors, such as decreased blood volume, the effects of anesthetic drugs, or changes in the patient's body position after the procedure. With the increasing incidence of hypotension at 10 minutes, this indicates that patients need more intensive monitoring during this period to prevent further complications.

Discussion

Respondent Characteristics Based on Age

Age distribution data of patients undergoing *sectio caesarea* (SC) and experiencing hypotension after spinal anesthesia shows that the majority of patients are from the Late Adolescent (17-25 years) and Early Adult (26-35 years) age groups. The Late Adolescent group dominates with a frequency of 66.7% or 20 people, followed by the Early Adult group of 33.3% or 10 people. This distribution pattern provides an important picture of the risk of hypotension in patients in the reproductive age category, especially those undergoing surgery *caesarean section*.

The age distribution showing the dominance of productive age groups in patients experiencing hypotension indicates that pregnancy at a young age (Late Adolescence and Early Adulthood) can increase the likelihood of hypotension after spinal anesthesia. According to (Ghaffari et al., 2020), the main risk factor for hypotension after spinal anesthesia is decreased blood volume, which often occurs in patients with their first pregnancy or who experience dehydration during the SC procedure.

Other factors that can influence the occurrence of hypotension are the age and physical condition of the patient. Late Adolescents and Early Adults have different physiological responses compared to older age groups. Research by Bogod et al. (2020), showed that younger patients are often more sensitive to changes in blood pressure due to the effects of spinal anesthesia, because their vascular tone is more easily affected by the sympathetic nerve blockade that occurs during the procedure.

Data illustrate the importance of paying more attention to blood pressure monitoring during SC surgery, especially for patients from younger age groups, who tend to experience hypotension more frequently after spinal anesthesia.

Description of Intraoperative Hypotension in Sectio Caesarea Patients with Spinal Block Anesthesia

Hypotension or decreased blood pressure in the intra-operative phase can be seen from hemodynamic monitoring using Non-Invasive Blood Pressure (NIBP). NIBP is a method of measuring blood pressure that is done without inserting a device into the blood vessels, but rather using a cuff worn around the patient's upper arm. This procedure can be done with two main techniques: manual auscultation, which relies on a stethoscope to listen to the sound of blood flow, and automated oscillometry, where a digital device measures vibrations in the blood vessels to determine systolic and diastolic pressure (Ghaffari et al., 2020).

It is important for anesthesia personnel to understand the ideal blood pressure during surgery, because the use of spinal anesthesia blocks can cause intraoperative hypotension which can be associated with complications and postoperative mortality. This is in accordance with the guidelines of The American Society of Anesthesiologists in *the Standards for Basic Anesthesia Monitoring* published in 1986 and updated in 2015, recommending that all patients undergoing anesthesia procedures have their blood pressure checked at least every five minutes. If there is a decrease in blood pressure during the anesthesia process, this can cause damage due to lack of blood supply (ischemia), which risks causing dysfunction in several vital organs such as the heart, brain, kidneys, and lungs (Lusiana, 2023).

Hypotension usually occurs within the first 15 minutes after injection. In women undergoing caesarean section with spinal block anesthesia, it is likely to experience orthostatic hypotension, especially if they experience decreased blood volume or dehydration due to fluid loss during surgery. Orthostatic hypotension occurs when a person moves from lying to standing and their blood pressure drops suddenly, causing symptoms such as dizziness or even fainting. In caesarean section patients, this condition can be exacerbated by the effects of spinal anesthesia which reduces blood vessel tone and interferes with blood pressure regulation. Therefore, blood pressure should continue to be monitored for up to 15 minutes after injection (Pontoh et al., 2023).

This research, respondents who experienced intraoperative hypotension in *caesarean section* patients with spinal anesthesia block that occurred in the 5th minute as many as 10 people with a percentage of 33.3%, in the 10th minute as many as 17 people with a percentage of 56.7%, and in the 15th minute as many as 3 people with a percentage of 10.0%. Meanwhile, those who did not experience hypotension in patients with intra-anesthesia spinal caesarean section were in the 5th minute as many as 20 people with a percentage of 33.3%, in the 10th minute as many as 13 people with a percentage of 21.7%, and in the 15th minute as many as 27 people with a percentage of 45.0%.

The results of this research are supported by research by (R. D. Indriani et al., 2024), the research revealed that the incidence of hypotension in patients undergoing caesarean section with spinal anesthesia most often occurred in the 10th minute after anesthesia, where 37 respondents (80.4%) experienced hypotension. Hypotension caused by spinal anesthesia in caesarean section is still common and can cause complications for the mother and fetus if not treated properly.

Management of hypotension in patients undergoing *cesarean section* relies heavily on close hemodynamic monitoring, especially in the first minutes after spinal anesthesia is administered. This approach is in accordance with the guidelines of the American Society of Anesthesiologists which recommend monitoring blood pressure every five minutes to detect significant decreases, which if left untreated, can risk further complications (Lusiana, 2023).

Post-spinal anesthesia hypotension is mainly caused by sympathetic nerve blockade resulting in peripheral vasodilation and redistribution of blood volume, thereby reducing systemic vascular resistance (SVR) and arterial blood pressure (T. Indriani et al., 2022). In addition, the effect of gravity on patients lying down after spinal anesthesia causes

redistribution of blood to the lower extremities due to loss of vascular tone. Decreased cardiac output due to reduced venous return due to vasodilation also contributes, plus individual factors such as low intravascular volume, dehydration, or certain medical conditions such as preeclampsia that increase the risk of hypotension (Pontoh et al., 2023). The effect of spinal anesthesia itself, which inhibits sympathetic impulse transmission at a high level, also affects systemic blood pressure control (Ghaffari et al., 2020).

For prevention, preloading intravenous fluids such as crystalloids or colloids before spinal anesthesia procedures effectively increases intravascular volume and reduces the risk of hypotension (Pontoh et al., 2023). In addition, the use of vasopressors such as ephedrine and phenylephrine is often used to treat hypotension by increasing blood pressure through arterial vasoconstriction (Lusiana, 2023). Frequent blood pressure monitoring, especially in the early minutes after spinal anesthesia, is essential for early detection and intervention (T. Indriani et al., 2022). Adjusting the patient's position, such as changing to a lateral or semi-Fowler position, can also help increase blood flow to the brain and vital organs.

Undetected or untreated hypotension can cause serious complications, including hypoperfusion of vital organs such as the brain, kidneys, and heart, impaired uteroplacental blood flow in obstetric patients that are at risk of harming the fetus, and postoperative complications that affect recovery and increase morbidity rates (Lusiana Devi et al., 2023). Therefore, further research is needed to better understand the risk factors, effective prevention techniques, and management of post-spinal anesthesia hypotension, especially in obstetric patients such as in cases of cesarean section.

CONCLUSION

The conclusion of this study shows that hypotension is a common complication in patients undergoing cesarean section with spinal anesthesia, especially in the age groups of Late Adolescents (17-25 years) and Early Adults (26-35 years). The highest incidence occurs in the first minutes post-anesthesia, peaking at 10 minutes. These findings emphasize the need for vigilant blood pressure monitoring during the intraoperative phase to prevent and manage hypotension, to ensure the safety of the mother and fetus. Although most cases can be effectively managed, this complication remains a significant concern, highlighting the importance of further research to improve anesthesia protocols and improve patient outcomes for future cesarean deliveries.

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