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CROSSECTIONAL STUDY

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Purpose: This study aimed to identify the incidence of hypotension after spinal anesthesia induction in SC patients during intra-anesthesia based on Body Mass Index (BMI), age, and baseline systolic blood pressure at Juanda Kuningan Hospital. Methods: This study used a quantitative descriptive method with a cross sectional approach. The sample in this study were all SC patients with spinal anesthesia techniques who met the criteria. The sampling technique used was purposive sampling with the slovin formula resulting in 90 respondents. And data analysis using univariate analysis. Findings: The results showed that the majority of respondents who experienced mild hypotension with excessive BMI status were 50 respondents (58.8%), the majority of respondents who experienced mild hypotension with early adulthood were 52 respondents (61.2%) and the majority of respondents who experienced mild hypotension with initial systolic blood pressure were at initial systolic blood pressure <120 mmHg and 120-130 mmHg as many as 31 respondents (36.5%). Conclusions: The results of this study illustrate that the majority of respondents will experience hypotension after spinal anesthesia induction. This is because spinal anesthesia can block sympathetic nerves, resulting in a decrease in circulating arterial tone, this condition causes peripheral arterial vasodilation. This vasodilating effect can result in a decrease in vascular resistance (hypotension). For further researchers to be able to develop this study to look for other variables that may be associated with the incidence of hypotension after induction of spinal anesthesia in SC patients so that the results of the study will show more variation.

Keywords: sectio caesarea; spinal anesthesia; hypotension

Introduction:

Sectio Caesarea (SC) is one of the techniques used to remove the baby by making an incision in the uterine wall through the front abdomen [1]. According to research by Palifiana & Khasanah (2019) in [2] SC is a delivery procedure that involves an incision in the abdomen and uterus. SC delivery rates are very high, reaching 30% to 70% in both public and private hospitals [3].

According to the World Health Organization (WHO) reported an increase in the global SC rate from 7% in 1990 to 21% in 2021. In Latin America and the Caribbean, nearly 4 in 10 births (43%) are SC. Some countries, namely the Dominican Republic, Brazil, Cyprus, Egypt, and Turkey, the number of SC surgeries even exceeds vaginal delivery [4].

Based on RISKESDAS data in 2018, SC deliveries in Indonesia reached 17.6%, with DKI Jakarta having the highest rate. SC deliveries in West Java accounted for 15.5% of the national total. The indications for SC in Indonesia involve conditions such
as fetus in transverse position, bleeding, seizure, premature rupture of membranes, prolonged labor, cord twisting, placenta previa, retained placenta, hypertension, and other factors [5].

In SC, the commonly used anesthesia technique is spinal anesthesia [6]. Spinal anesthesia is the process of inserting local anesthetic drugs into the subarachnoid space. Indications for spinal anesthesia according to [7] spinal anesthesia is generally used for surgery on the lower abdomen, perineum, and lower extremities, especially for procedures located below the umbilicus.

Spinal anesthesia is an effective anesthetic option for SC [8]. Spinal anesthesia technique is easier than epidural block, has rapid onset of action, low failure rate, and more cost efficient for elective SC surgery [9]. Although effective, spinal anesthesia can also cause complications such as back pain, post-puncture headache, nausea, vomiting, hypotension, hearing loss, neurological injury, and others. Hypotension is a common complication during spinal anesthesia, with an incidence of up to 80% [10]. Based on research [11] the incidence rate of hypotension in patients after spinal anesthesia injection reached 56.3%. According to research [12] the incidence of hypotension in mothers undergoing SC surgery after receiving spinal anesthesia reached 64%.

Hypotension after spinal anesthesia occurs due to decreased systemic vascular resistance or cardiac output [13]. Hypotension is defined as blood pressure less than 90/60 mmHg [14]. Spinal anesthesia induced hypotension can be defined as a decrease in blood pressure to 80% of the baseline blood pressure measured before the injection of spinal anesthesia, or a decrease in systolic blood pressure to 100 mmHg or lower [15].

Factors that influence the incidence of hypotension are height of sensory block, weight of the infant, interval between spinal anesthesia and incision, baseline blood pressure, anesthesiologist experience, and other factors [12]. Another factor according to [11] these include high sympathetic block, body mass index (BMI), previous fluid intake, injection site, and vasopressor use. Meanwhile, according to research [10] age is one of the variables that has an influence on the incidence of hypotension after spinal anesthesia injection. Hypotension in SC surgery can potentially pose serious risks to the mother, such as loss of consciousness and also risks to the baby with the potential for oxygen deprivation and brain damage [16].

Techniques commonly used to overcome hypotension include the use of vasopressors, fluid co-loading, and the use of levobupivacaine during induction [17]. In addition, elevating the legs immediately after injecting spinal anesthesia drugs can reduce the incidence of hypotension [18]. According to [19] women in good health should receive vasopressors to prevent hypotension during cesarean section using spinal anesthesia. In addition, administering low doses of spinal anesthesia for SC provides much higher hemodynamic stability and can significantly reduce the incidence of hypotension and its side effects [20].

Based on research [21], hypotension occurred at 5 minutes after spinal anesthesia with an average blood pressure of 89.28 mmHg systolic and 59.35 mmHg diastolic. The preliminary survey results showed that 70% of elective SC patients experienced hypotension at Juanda Kuningan Hospital. Therefore, researchers are interested in conducting further research related to "The Incidence of Hypotension After Spinal Anesthesia Induction in Sectio Caesarea Patients at Juanda Kuningan Hospital."

Material and Methods:
This study used a quantitative descriptive method with a cross-sectional approach. The place of implementation of this research is in the Central Surgical Installation Room Juanda Kuningan Hospital, West Java. This study took place from October 2022 to August 2023, with data collection conducted on June 13 to July 6, 2023. The population that became the subject of this study were all patients who underwent caesarean section using spinal anesthesia technique. The results of the pre-survey showed that for 3 months at Juanda Kuningan Hospital there were 343 patients undergoing cesarean section with spinal anesthesia, with an average of about 115 patients per month.

The sampling method used is non-probability sampling with a purposive sampling approach where the determination of the sample takes into account specific factors in the sampling technique [22]. The slovin formula used:

\[ n = \frac{N}{1+N(e)^2} \]

Description:
- \( n \) = Number of samples or number of respondents
- \( N \) = Total population
- \( e \) = 0.05 (5%) margin of error

The variable in this study is a single variable, namely hypotension. The instruments used were bedside monitors and blood pressure observation sheets. The data analysis used in this study was univariate analysis using descriptive statistical methods to describe the characteristics of these variables. Furthermore, the ethical number in this study is number. B.LPPM-UHB/1594/03/2023.

Data Collection and Outcome Measurement

The researcher conducted an interview to find out weight before pregnancy, weight during pregnancy, height, and age. Then monitor blood pressure before induction of spinal anesthesia and observe blood pressure after induction of spinal anesthesia per 5 minutes in 15 minutes.

Statistical Analysis

The data analysis used in this study was univariate analysis. Univariate analysis uses descriptive statistical methods to describe the parameters of each variable. Univariate analysis in this study aims to identify the incidence of hypotension after spinal anesthesia induction in SC patients at Juanda Kuningan Hospital.

Findings/Result

This study was conducted on June 13 to July 6, 2023 at Juanda Kuningan Hospital, West Java. The number of samples in this study were 90 patients with sampling techniques using purposive sampling while data analysis used univariate tests. From this study the following results were obtained:

<table>
<thead>
<tr>
<th>Body Mass Index (BMI)</th>
<th>Hypotension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less</td>
<td>f (%)</td>
<td>f (%)</td>
</tr>
<tr>
<td>Normal</td>
<td>5</td>
<td>5,6</td>
</tr>
<tr>
<td>Excess BMI</td>
<td>30</td>
<td>33,3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>55,6</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>94,4</td>
</tr>
</tbody>
</table>

Based on table 1. The majority of IMT respondents in this study were in excess IMT with mild hypotension as many as 50 respondents (55.6%).

<table>
<thead>
<tr>
<th>Age</th>
<th>Hypotension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f (%)</td>
<td>f (%)</td>
</tr>
<tr>
<td>Late teens</td>
<td>24</td>
<td>26,7</td>
</tr>
<tr>
<td>Early adulthood</td>
<td>52</td>
<td>57,8</td>
</tr>
<tr>
<td>Late adulthood</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1. Incidence of Hypotension After Spinal Anesthesia Induction Based on BMI

Table 2. Incidence of Hypotension After Spinal Anesthesia Induction Based on Age
Based on table 2. The majority of respondents in this study were in early adulthood with mild hypotension as many as 52 respondents (57.8%).

<table>
<thead>
<tr>
<th>Initial systolic blood pressure</th>
<th>Hypotension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lightweight</td>
<td>Medium</td>
</tr>
<tr>
<td>&lt;120 mmHg</td>
<td>31</td>
<td>34,4</td>
</tr>
<tr>
<td>120–130 mmHg</td>
<td>31</td>
<td>34,4</td>
</tr>
<tr>
<td>&gt;130 mmHg</td>
<td>23</td>
<td>25,6</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>94,4</td>
</tr>
</tbody>
</table>

Table 3. Incidence of Hypotension After Spinal Anesthesia Induction Based on Initial Systolic Blood Pressure

Based on table 3. The majority of respondents in this study had initial systolic blood pressure <120 mmHg and initial systolic blood pressure 120-130 mmHg with mild hypotension as many as 31 respondents (34.4%).

Discussions

Incidence of Hypotension After Spinal Anesthesia Induction Based on BMI

Based on the research results described in table 1. The majority of IMT in this study were in the excess IMT category with mild hypotension, namely 50 respondents (55.6%). This is according to researchers in pregnant women who have excess BMI have a greater amount of fat tissue, local anesthetic drugs that accumulate in fat tissue will be removed for a long time. So that it gives a long side effect, one of which is a decrease in blood pressure (hypotension).

This is supported by the theory [11] which states that the duration of the effect of local anesthetic drugs is generally related to the ability of these anesthetic drugs to dissolve in fat. This is because anesthetic drugs that can dissolve in fat will collect in fat tissue and then be released gradually over a longer period of time. As a result, side effects such as decreased venous return of blood flow (hypotension) may persist over a long period of time.

Incidence of Hypotension After Spinal Anesthesia Induction Based on Age

The majority of respondents in this study were in early adulthood with mild hypotension as many as 52 respondents (57.8%). This is according to researchers in young adult patients, sympathetic blockade only reaches the mid-thorax, resulting in mild hypotension. This is due to the higher the level of spinal blockade, the more compensatory mechanisms that occur as a result of suppression of the sympathetic system.

The hypotension that occurs when spinal anesthesia is administered is caused by suppression of the sympathetic nerves, which govern the regulation of smooth muscle tone in the blood vessels. According to [23] states that blockade of preganglionic sympathetic nerve fibers results in dilation of venous blood vessels. This causes a shift in blood volume, which leads to the splanchnic nerves and lower extremities, which can ultimately result in decreased blood flow to the heart.

In this study the severity of hypotension or incidence of moderate hypotension was in late adulthood. This is according to researchers when patients are given spinal anesthetic drugs will cause sympathetic nerve blockade, so that at an older age the elasticity of blood vessels can decrease and the ability of blood vessels to cope with changes in blood volume due to spinal anesthetic drugs becomes more limited which causes a decrease in response to changes in blood pressure and triggers hypotension.

This is in line with research [10] which states that the age factor can also affect the occurrence of hypotension after the administration of spinal anesthesia. This is
because the older a person is, the higher the risk of hypotension. Elderly patients are classified in the extreme age category because they have a higher risk of experiencing hypotension after surgery. In addition, anesthesia procedures in elderly patients can also result in arteries becoming less elastic compared to younger patients.

**Incidence of Hypotension After Spinal Anesthesia Induction Based on Initial Systolic Blood Pressure**

Based on table 3. The majority of respondents in this study had initial systolic blood pressure <120 mmHg and initial systolic blood pressure of 120-130 mmHg with mild hypotension as many as 31 respondents (34.4%). According to the researchers, this is because spinal anesthesia can block sympathetic nerves, resulting in a decrease in circulating arterial tone, this condition causes vasodilation of peripheral arteries. This vasodilating effect can result in a drastic decrease in vascular resistance. This is supported by the theory that spinal anesthesia triggers dilation of blood vessels in peripheral areas and also reduces systemic vascular resistance, which ultimately results in hypotension. [21].

This is in line with research [12] which states that patients with an initial systolic blood pressure below 120 mmHg or between 120-130 mmHg have a three times higher risk of developing hypotension compared to those with an initial systolic blood pressure above 130 mmHg. A higher baseline systolic blood pressure provides a greater degree of safety. Patients with low baseline systolic blood pressure show low systemic vascular resistance initially, thus increasing the risk of developing hypotension.

**Limitations and Future Research**

In collecting data on the incidence of hypotension based on BMI of pregnant women in the recommended weight gain is very limited because it does not see the MCH book so it cannot know the exact weight before pregnancy and there is no tool to see the current weight and height of the respondent. And in this study, the limited variables did not explain other factors associated with the incidence of hypotension after induction of spinal anesthesia in SC patients.

**Conclusion**

The results of this study illustrate that the majority of respondents will experience hypotension after induction of spinal anesthesia. This is because spinal anesthesia can block sympathetic nerves, resulting in a decrease in circulating arterial tone, this condition causes peripheral arterial vasodilation. This vasodilating effect can result in a decrease in vascular resistance (hypotension). And for future researchers to be able to develop this study to look for other variables that may be associated with the incidence of hypotension after induction of spinal anesthesia in SC patients so that the results of the study will show more variation.

**Acknowledgments**

My gratitude goes to all SC patients with spinal anesthesia at Juanda Kuningan Hospital who have been willing to become research respondents, thanks also to the supervisor who has provided direction, guidance, advice and time to researchers during the research, and thanks to Juanda Kuningan Hospital, West Java, which has been willing to give permission for this research.

**References**

2. Fadhilah ghina farrah, Sari I. Analisis Perawatan Partus Sektio Caesarea


