VIVA MEDIKA
Jurnal Kesehatan, Kebidanan, dan Keperawatan
Homepage: http://ejournal.uhb.ac.id/index.php/vm
P-ISSN: 1979-2026 E-ISSN: 2656-1034
DOI: 10.35960/vm.v16i4.1211

Overview of Hypotension Incidents in Elderly Patients Receiving Spinal Anesthesia at RSUD Cilacap in 2023

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ABSTRACT

Spinal anesthesia is a type of regional anesthesia performed by injecting local anesthetic drugs into the subarachnoid space which can cause hypotension with an incidence of 16% - 33%. Hypotension is a drop in systolic blood pressure below 90mmHg. Risk factors that can increase the incidence of hypotension in spinal anesthesia include age. In young adults, hypotension is usually less severe than the elderly with the same high spinal anesthesia. The purpose of this study was to determine the picture of hypotension events in the elderly who received spinal anesthesia techniques at the Central Surgical Installation of Cilacap Hospital The design of this study was quantitative descriptive with sampling using convenience sampling techniques. The study was conducted in June 2023. The sample of this study was elderly >60 years old totaling 52 respondents. The results of this study showed the incidence of hypotension as many as 38 respondents (67.3%) and not hypotension 17 respondents (32.7%). This study shows that the elderly are one of the factors in the incidence of post-spinal anesthesia hypotension.

Keywords : Anesthesia spinal, Elderly, Hypotension

1. INTRODUCTION

Spinal anesthesia is one of the regional anesthesia techniques performed by injecting a local anesthetic into the subarachnoid space. It is an effective technique in lower limb and lower abdominal surgical procedures (Sukmaningtyas et al., 2021). Worldwide data sourced from the World Health Organization (WHO) in 2017 indicate that more than 300 million surgical procedures are performed annually, with approximately 5% or 15 million procedures being done using spinal anesthesia (Khan et al., 2017).

The spinal anesthesia technique is commonly used in surgeries, but a common complication associated with it is hypotension. Hypotension is defined as a decrease in blood pressure below the accepted low value, with systolic pressure falling below 90/60 mmHg (Sharma, 2023).

Hypotension is caused by sympathetic nerve blockade resulting from the injection of spinal anesthesia, leading to blood vessel vasodilation. Vasodilation reduces the venous return to the heart and decreases cardiac output. This decrease in systemic blood vessel resistance leads to hypotension (Chusnah, 2021).

The factors that influence the occurrence of hypotension in spinal anesthesia include age, patient position, body mass index (BMI), the type of local anesthetic drug, injection location, level of blockade, and patient-related conditions. One of the risk factors that can increase the occurrence of

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hypotension in spinal anesthesia is age (Puspitasari et al., 2019)

Based on previous research, hypotension is a common complication during spinal anesthesia with an incidence rate ranging from 16% to 33% (Hofhuizen et al., 2019). Research conducted by (Hakim, 2020) indicates that after the age of 50, the incidence of hypotension progressively increases from 10% to 30%. In younger adults, sympathetic blockade up to the thoracic level may not cause hypotension or only mild hypotension. In the elderly, the same level of blockade can result in severe hypotension. Research by (Malima, 2019) shows a 56% incidence of post-spinal anesthesia hypotension in elderly patients. Physiological hemodynamic changes with advancing age and limited cardiovascular compensatory mechanisms contribute to a decrease in cardiac output and blood pressure in response to spinal anesthesia. Hypotension in elderly patients can lead to decreased consciousness, pulmonary aspiration, respiratory depression, and cardiac arrest. Prolonged intraoperative hypotension can result in increased postoperative morbidity. Severe hypotension can also cause cardiac arrest, which is a serious complication of spinal anesthesia (Pardo, 2022)

Based on the preliminary study conducted at the Central Surgery Installation of RSUD Cilacap, the number of elderly patients undergoing surgery with spinal anesthesia in October-November 2022 was a total of 85 patients. If we average the number of elderly patients per month, it comes to about 42 patients. According to interviews with anesthesia personnel at the Central Surgery Installation of RSUD Cilacap on January 17th, hypotension is a significant complication during spinal anesthesia. Out of the 8 elderly patients who underwent spinal anesthesia procedures, the results showed that 5 of them experienced hypotension, while the remaining 3 had blood pressure levels within the normal range.

According to (Chesnut, 2009) in the book 'Obstetric Anesthesia Principles and Practice,' common techniques used to address hypotension include leg elevation and compression, preloading or coloading, uterine displacement, reducing the anesthetic dose, and administering vasopressors. Alternatives to prevent hypotension include the head-up position after the injection of hyperbaric local anesthetics, the administration of crystalloid or colloid fluids before spinal anesthesia, vasopressors, lower limb elevation, or the use of stockings.

Based on the description above, the research problem in this study is What is the incidence of hypotension in the elderly using the spinal anesthesia technique at RSUD Cilacap?

The aim of this research is to understand the incidence of hypotension in the elderly using the spinal anesthesia technique in the Central Surgery Installation of RSUD Cilacap.

2. RESEARCH METHODS

This research employs a quantitative descriptive method to describe the incidence of hypotension in elderly patients during intraoperative spinal anesthesia at RSUD Cilacap. The population in this study includes all elderly patients aged over 60 years who will undergo spinal anesthesia in June 2023 at the Central Surgery Installation of RSUD Cilacap, with a total of 52 respondents. The sampling technique used is convenience sampling. Data collection for this study involves both primary and secondary data. Primary data collection involves the researcher observing hypotension incidents through blood pressure readings displayed on the anesthesia bedside monitor for 20 minutes after the induction of spinal anesthesia. Secondary data includes information on age, ASA physical status, and the type of illnesses recorded in the patients' medical records.

Data collection was conducted by the researcher through direct observation of the respondents' blood pressure after spinal anesthesia procedures. The researcher recorded and documented the observations on an observation sheet. The observation sheet includes the respondent's code, age, gender, ASA physical status, blood pressure before and after spinal anesthesia, and the occurrence of hypotension. The researcher has obtained ethical approval from KEFK Universitas

Harapan Bangsa with reference number B.LPPM-UHB/1668/04/2023.

The data analysis used in this research is univariate analysis, which aims to describe or summarize the characteristics of each research variable. Mean, minimum, and maximum values are used for the age variable. After data collection, the next step is data processing, which is done manually through a series of steps including editing, coding, data entry, and tabulation.

3. RESULT AND DISCUSSION

3.1 Results

Tabel 4. 1 Frequency distribution of respondent characteristics based on gender and ASA physical status in the elderly at RSUD Cilacap (n=52)

Variable	*f*	(%)
Gender		
Female	14	26,9
Male	38	73,1
Total	**52**	**100**
ASA Physical Status		
ASA I	0	0
ASA II	9	17,3
ASA III	28	53,8
ASA IV	15	28,8
ASA V	0	0
Total	**52**	**100**

Source : Secondary Data, Juni 2023

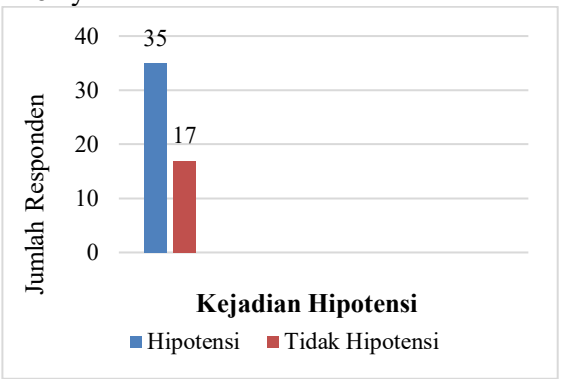
Based on Table 4.1 above, the characteristics of the respondents in this study are as follows: a majority of males, with 38 respondents (73.1%), and females, with 14 respondents (26.9%). Regarding the characteristics of the respondents based on ASA physical status, the study found that 9 respondents (17.3%) were ASA II, 28 respondents (53.8%) were ASA III, and 15 respondents (28.8%) were ASA IV.

Tabel 4. 2 Average age of the elderly who received spinal anesthesia at RSUD Cilacap (n=52)

Variable	*Mean*	Min	Maks
Age > 60 years	68,37	60	84

Source : Secondary Data, Juni 2023

Based on Table 4.2 above, the characteristics of the respondents in terms of age had an average age of 68.37 years, with a minimum age of 60 years and a maximum age of 84 years.



Source : Primary Data, Juni 2023.

Image 1. Distribution of Hypotension Incidencei

Based on Graph 4.1, the research findings indicate that hypotension occurred in 35 respondents (67.3%) among the elderly, while 17 respondents (32.7%) did not experience hypotension.

3.2 Discussion

Description of Respondent Characteristics Based on Gender

Based on the characteristics of respondents' gender, it is evident that out of 52 respondents, the majority were males, accounting for 38 respondents (73.1%), while females constituted 14 respondents (26.9%). This may be attributed to the fact that at the Central Surgery Installation of RSUD Cilacap, many patients undergo urological procedures, such as TURP (Transurethral Resection of The Prostate) and herniotomy, which are more common among male patients. Previous research on the relationship between gender and hypotension was not found. The findings of this study align with the research conducted by Chaidir & Putri (2014), which stated that there is no significant relationship between gender (male and female) and the occurrence of hypotension. In general, blood pressure differences between males and females do not have significant clinical implications.

Description of Respondent Characteristics Based on ASA Physical Status

Based on the characteristics of ASA physical status, the respondents exhibited the following distribution: out of 52 respondents, 9 respondents (17.3%) were classified as ASA II, 28 respondents (53.8%) as ASA III, and 15 respondents (28.8%) as ASA IV. These findings are consistent with the research conducted by Jakobbson et al. (2017), which showed that in elderly patients, with an average age of 74 years (ranging from 66 to 89 years), ASA II and ASA III predominated.

According to the researchers' assumptions, in this study, the health conditions of elderly patients with various systemic diseases, especially those with a history of hypertension and uncontrolled diabetes mellitus (DM), may not be ideal. There is a possibility that health conditions could have an impact on hypotension, but it is not significant. This may be explained by the fact that, in the initial 20 minutes following the induction of spinal anesthesia, hypotension occurring during intraoperative events could be due to the interaction of the administered spinal anesthetic drugs. This is consistent with study by (Malima, 2019) which states that maintaining systolic and diastolic blood pressure control is considered crucial for hemodynamic stability during the perioperative period.

Description of Respondent Characteristics Based on Age

Based on the characteristics of respondents' age, the results show that out of 52 respondents, the average age of the elderly was 68.37 years, with a minimum age of 60 years and a maximum age of 84 years. Advanced age is often associated with an increased risk of various chronic medical conditions, some of which may require surgical intervention. This is consistent with study by (Hofhuizen et al., 2019) which indicated that elderly patients over 65 years of age undergoing surgery with spinal anesthesia had an average age of 74 years (ranging from 65 to 89 years) among 33 respondents.

Although age is not a contraindication for anesthesia and surgical procedures, the incidence of comorbidities and diseases in elderly patients tends to be higher compared to younger patients due to the aging process. Aging is characterized by a gradual loss of tissue regenerative capacity, leading to difficulties in self-repair and the maintenance of normal structure and function (Butterworth et al., 2013).

Incidence of Hypotension in Elderly Patients with Spinal Anesthesia

The results of this study indicate that out of 52 respondents aged over 60 years, 35 respondents (67.3%) experienced hypotension, while 17 respondents (32.7%) did not. The occurrence of hypotension is more common among geriatric patients. Hypotension is caused by a decrease in vasomotor venous tone, leading to venous pooling and subsequently a reduction in venous return, which can result in decreased cardiac output (Dwiputra, 2023).

Based on research conducted by (Chusnah et al., 2021) titled "The Relationship between Age and the Incidence of Hypotension in Patients Undergoing Spinal Anesthesia at the Central Surgery Installation of RSUD Bangil," it is stated that the older the age of the respondents, the higher the risk of experiencing hypotension. This is because spinal anesthesia can indirectly affect the cardiovascular system through sympathetic nervous system blockade. The occurrence of hypotension in elderly patients is due to changes in cardiovascular function, where arterial compliance decreases, making it unable to compensate for the decrease in systolic blood pressure caused by spinal anesthesia.

This is consistent with study by (Malima, 2019) titled "Predictors of Post-Spinal Hypotension in Elderly Patients: A Prospective Observational Study in the Durban Metropolis," which states that the incidence of hypotension after spinal anesthesia is 56%, with an average age of 67 years. Hemodynamic physiology decreases with age, and limited cardiovascular compensatory mechanisms contribute to the decrease in cardiac output and blood pressure in response to spinal anesthesia.

This is consistent with study by (Rustini et al., 2016) that showed the occurrence of hypotension after spinal anesthesia in 49% of cases. Age is one of the risk factors for hypotension in spinal anesthesia. This may be due to the higher tonus of the autonomic blood vessels remaining after sympathetic denervation and the more active

compensatory reflexes. A decrease in cardiac output will correspond to increasing age. This also explains the proportional decrease in blood pressure, which is more significant in elderly patients after peripheral vasodilation occurs. The incidence of hypotension progressively increases after the age of 50, from 10% to 30%.

According to the assumptions of this study, older patients are at a higher risk of experiencing intraoperative hypotension due to physiological changes in the body, primarily in the cardiovascular system. The theory proposed by (Joshi et al., 2013) suggests that elderly patients experience cardiovascular changes, including increased stiffness of the arterial blood vessels, increased peripheral vascular resistance, and a decrease in cardiac output. As a result of spinal anesthesia, the sympathetic nervous system can be affected in the cardiovascular system, leading to dynamic changes. This is evident from blood pressure measurements, where blood pressure decreases after spinal anesthesia administration, as observed within 20 minutes. Blood pressure is influenced by three factors: arterial compliance, blood viscosity, and blood vessel capacity (Sarii, 2012).

CONCLUSSION

Based on the results and discussions of the study above, the following conclusions can be drawn:

1. In this study, the majority of elderly patients who received spinal anesthesia were males, with 38 respondents (73.1%), while females accounted for 14 respondents (26.9%).
2. According to ASA physical status classification, 28 respondents (53.8%) were categorized as ASA III, 15 respondents (28.8%) as ASA IV, and 9 respondents (17.3%) as ASA II.
3. The average age of the respondents was 68.37 years, with a minimum age of 60 years and a maximum age of 84 years.
4. Hypotension occurred in 35 elderly patients over 60 years of age, accounting for 67.3% of the cases, while 17 respondents (32.7%) did not experience hypotension.

RECOMMENDATION

For educational institutions, it is advisable to enhance the curriculum and references that discuss the factors contributing to post-spinal anesthesia hypotension, especially in the elderly population.

For all hospitals, the findings of this study can serve as input for the anesthesia team at RSUD Cilacap to implement preventive measures against hemodynamic changes that may lead to post-spinal anesthesia hypotension.

For future researchers, it is recommended to investigate the timing of hypotension occurrence and the duration of the operation concerning the incidence of hypotension in elderly patients after spinal anesthesia.

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