

Original Article

PROFILE HEMODYNAMICS (BLOOD PRESSURE AND HEART RATE) CHANGES IN THE USE OF ADRENALINE IN CESAREAN SECTION WITH SPINAL ANESTHESIA AT DR SOETOMO SURABAYA HOSPITAL**Ainur Rahmah^{1a}, Arie Utariani², Achmad Basori³**¹Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia²Department of Anesthesiology and Reanimation, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo Academic Hospital, Surabaya, Indonesia³Departement Pharmacology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia^aCorresponding author: ainrhmess@gmail.com**ABSTRACT**

Introduction: spinal anesthesia block is one of anesthesia technique that aims to block motor nerves resulting in paresis or anesthesia and paralysis or loss of muscle function in myotomes that are the same level as blocked dermatomes. Caesarean section is one of the surgical actions that are often performed mainly in birth cases. Besides that, the mechanism of the effects of giving birth to the operation of type B autonomic caesarean section autonomic nerve pronglion nerve which results in a decrease in the resistance of peripheral veins and peripheral vasodilatation which results in an imbalance in hemodynamics especially in blood pressure and heart rate and cause of hypotension. Vasopressor, fluid therapy, vasoconstrictor are given to reduce the toxicity of local anesthesia and to overcome hypotension. **Objective:** To determine hemodynamic changes (blood pressure and pulse) in spinal anesthesia block surgery patients with caesarean section at Dr Soetomo Hospital. **Material and Method:** This research is descriptive with a retrospective from January - March 2018, the sample taken with total sampling from secondary data from the central medical record at RSUD Dr. Soetomo. **Results and Discussion:** 68 samples were obtained from inclusion and exclusion criteria there was a change in blood pressure and pulse in patients with caesarean section with spinal anesthesia block with the addition of vasoconstrictors. There was a decrease in average systolic pressure 13.25, diastole 18.25 and pulse 4.5 and in no increase. There was a decrease in average systolic pressure 11.9286, diastole 13.8929 and pulse 5.6429 and no addition of $p > 0.05$ the two are not significantly different. **Conclusion:** addition of adrenaline to spinal anesthesia in caesarean section patients was not cause significant hemodynamic (blood pressure and heart rate) changes.

Keywords: Adrenaline; Spinal Anesthesia; Heart Rate; Caesarean Section; Blood Pressure**ABSTRAK**

Pendahuluan: Spinal anestesia salah satu teknik anestesi bertujuan untuk memblokir saraf motorik yang mengakibatkan paresis atau mati rasa serta paralisis atau kelumpuhan otot pada miotom pada bagian tubuh yang selevel dengan dermatom yang telah di blok. Operasi seksio sesaria merupakan salah satu tindakan operasi yang sering dilakukan utamanya pada kasus kelahiran. Mekanisme efek yang ditimbulkan pada ibu melahirkan daengan operasi seetio caesaria saraf pre ganglion otonom sabut saraf tipe B yang mengakibatkan penurunan tahanan pembuluh perifer serta vasodilatasi pembuluh perifer yang mengakibatkan imbalance pada hemodinamik khususnya pada tekanan darah dan nadi yang menyebabkan hipotensi. Untuk mengatasi hipotensi diberikan vasopressor, terapi cairan serta vasokonstriktor untuk mengurangi toksisitas dari anestesi lokal yang diberikan. **Tujuan:** Mengetahui perubahan hemodinamik (tekanan darah dan nadi) pada anestesi spinal blok dengan penambahan vasokonstriktor untuk prolonge duration operasi pasien operasi secio caesaria RSUD Dr Soetomo. **Bahan dan Metode:** Penelitian ini bersifat deskriptif dengan sample retrospective yang diambil dengan total sampling dari secondary data rekam medis pusat RSUD Dr. Soetomo Januari – Maret 2018. **Hasil dan Pembahasan:** 68 sample yang di dapat dari kriteria inklusi dan eksklusi terdapat perubahan tekanan darah dan nadi pasein pasien sectio caesaria dengan spinal anestesi blok dengan penambahan vasokonstriktor penurunan rata – rata tekanan sistole 13,25, diastole 18,25 dan nadi 4,5 serta pada tidak ada penambahan didapatkan penurunan rata – rata tekanan sistole 11,9286, diastole 13,8929 dan nadi 5,6429 dan keduanya di uji dengan Independent T Test didapatkan $p > 0,05$ keduanya tidak berbeda bermakna **Kesimpulan:** penambahan adrenalin pada spinal anestesi pasien seksio sesaria tidak menyebabkan adanya perubahan hemodinamik (tekanan darah dan nadi) yang signifikan



Kata Kunci: Adrenalin; Anestesi Spinal; Nadi; Seksio Sesaria; Tekanan darah

Article info: Received: November, 18th 2019; Revised: November, 25th 2019; Accepted: January, 14th 2020; Published: January, 30th 2020

INTRODUCTION

One type of anesthesia that is often used in surgery, especially caesarean section is a spinal anesthesia block or SAB, which is one type of regional anesthesia. According to WHO, in 2015 recorded prevalence in Indonesia, caesarean section reached 10% - 15%. *Hypotension* or decrease in blood pressure is one of the most common acute complications of spinal anesthesia.¹ The incidence of hypotension under spinal anesthesia is significant. In several studies mentioning the incidence reached 8% -33% case surgery related to hypotension, highest found in the obstetric portion with 11.8% if compared to general surgery 9.6% and hypotension due to trauma 4.8%, incident maternal hypotension in cesarean section due to spinal anesthesia reached 83.6%.^{2,3,4}

Neuraxial anaesthesia is the commonest, safest, and most logical choice of anaesthesia for caesarean section. Various options include spinal anaesthesia, and epidural anaesthesia, or combined spinal-epidural (CSE) anaesthesia.^{5,9} Hypotension in spinal anesthesia caused by the blockade of sympathetic nerves that function to regulate vascular smooth muscle tone. Blockade of preganglionic sympathetic nerve fibers that causes venous vasodilation, resulting in a shift in blood volume especially to the splanchnic and lower extremities so that it will reduce blood flow back to the heart.^{6,7}

The mechanism of effect on the mother giving birth with caesarean section is in the autonomic pre ganglion nerve type B nerve that causes a decrease in peripheral

resistance and peripheral vascular vasodilatation resulting in an imbalance in hemodynamics especially in temperature and blood pressure or hypotension.^{6,7}

Factors that influence the degree and incidence of hypotension in spinal anesthesia include the type of local anesthetic drug, the level of sensory inhibition, age, sex, body weight, patient's physical condition, patient's position, surgical manipulation.^{6,7}

The addition of a vasoconstrictor to a local anesthetic solution such as in spinal anesthesia block has several potentially beneficial effects. It may decrease the peak plasma concentration of the local anesthetic agent, increase the duration of anesthesia and improve its quality, decrease the minimum concentration of local anesthetic agent needed for nerve block and reduce blood loss during surgical procedures.^{8,9}

Based on the description above, the researcher wants to find out more about Profile Hemodynamic changes in the use of lidodex and adrenaline in cesarean section with spinal anesthesia at Dr Soetomo General Hospital.

MATERIAL AND METHODS

This research was conducted at Dr Soetomo General Hospital in a manner retrospectively with a descriptive method involving 68 patients that included in the inclusion criteria of caesarean section patients with spinal anesthesia block from January - March 2018 in total sampling.

Demographic and clinical data from patients were collected from medical record status in the form of anthropometry,



pregnancy status, and history of anesthesia when the patient was under caesarean section. Health research ethics committee Dr Soetomo Surabaya approved this research. (0675/KEPK/IX/2018) Data processing uses the Statistical Program for Social Sciences (SPSS) v20.0 to present data.

RESULT AND DISCUSSION

The subjects of this study were 68 patients who included in the inclusion criteria of about 198 patients with caesarean section at RSUD Dr Soetomo.

The data obtained included 68 samples in 3 months January – March 2018 from 196 total sampling it was excluded because of general anesthesia, incomplete data and comorbid with cardiovascular disease, so 68 samples were obtained in this study with spinal anesthesia and using lidodex, vasopressor with a minimum age of 18 years pregnant women and a maximum age of 45 years, with an average age of 33.015 years and a standard deviation of 6.9400. Anthropometric distribution of body weight of pregnant women patients from 68 samples. With the lightest weight of 42.8 kg and the heaviest weight of 102 kg, which has an average of 68.435 kg and a standard deviation of 12.8628. For the height of pregnant women patients, there is the lowest height of 139 cm and the highest of 166.5 cm, which has an average of 153,592 and a standard deviation of 6,1472. From demographic data, there were 15 BMI before birth, 15 people with BMI 19.8-26.0, 23 people with a BMI 26.0-29.0, and 30 people with BMI more than 30.

There were 68 patients, 60 patients, spinal anesthesia with lidodex and 12

patients with lidocaine only and both given by vasopressor in spinal anesthesia. In the results of the data obtained in this study, there was a change in blood pressure and heart rate in the administration of anesthetic drugs with spinal anesthesia block in caesarean section through the normality of Saphiro-Wilk data having significance $p > 0.05$ so that the data distribution is normal. And obtained 56 samples without the addition of vasoconstrictors and 12 samples with the addition of vasoconstrictors In the results of the data obtained in this study there was a change in blood pressure and heart rate in the administration of anesthetic drugs with spinal anesthesia block or SAB with lidodex or lidocaine and dextrose in section caesarean through the normality of Saphiro-Wilk data having significance $p > 0.05$, the data distribution is normal.

Table 1. Demographic profile of patients

Characteristics	N (%)
Age	
<35 years	38 (55.8)
≥35 years	30 (44.2)
BMI (Kg)	
< 19.8	0 (0)
19.8 - 26.0	15 (22.0)
26 – 29	23 (33.8)
>29	30 (44.2)
Lidodex (Lidocaine and Dextrose)	
With vasoconstrictor	12 (17.64)
Without Vasoconstrictor	56 (82.36)

*All sample is using lidodex for anesthesia drug and addition by vasopressor in caesarean section with spinal anesthesia

In this study, the inclusion of caesarean section patients with Lidodex and given by vasopressor with vasoconstrictor and Lidodex have given by vasopressor without vasoconstrictor was, and homogeneous

data distribution was obtained. Then the sample was examined in the use of vasoconstrictors in spinal anesthesia and not using vasoconstrictors through secondary data recording of medical records and observed hemodynamic changes mainly in blood pressure and heart rate.

Spinal Anesthesia is frequently accompanied by hypotension, which may be defined in absolute terms as a systolic blood pressure (SBP) of 90 or 100 mmHg or relative terms as a percentage it is about 20% fall from baseline.⁶ Hypotension in spinal anesthesia is mainly a result of the blockade of sympathetic nerves that function to regulate vascular smooth muscle. Preganglionic sympathetic nerve fiber blockade which causes venous vasodilation, resulting in a shift in blood volume especially to the splanchnic and lower extremities so that it will reduce blood flow back to the heart and it can make hemodynamic changes after spinal anesthesia block anesthesia using lidocaine anesthesia, local anesthesia lidocaine works by blocking transmission by obstruction in the sodium channel. Binding of lidocaine with intracellular sodium channels will inhibit sodium ions from entering the cell and prevent the comparison of premedication of nerve membrane potential. The mechanism provides anesthetic and analgesic effects by inhibiting the transmission of pain sensations in nerve fibers.^{7,10} There are several ways to reduce the effects of massive hypotension, and several studies have been conducted for approximately three decades with varied results.^{2,8} one of them using vasoconstrictors to prolong the duration of anesthesia and to minimize hypotension mechanism caused by

vasodilation.² Solutions containing vasoconstrictors spread in the same way as those without, although block duration may be prolonged. It makes this drug is usually using in spinal anesthesia^{9,10} Vasopressor drugs act the first line to the management of hypotension using on α 1-, β 1- and β 2-adrenoreceptors in the heart and vascular system. The physiological response of these adreno-receptor agonists depends on the type and location of the receptors. Vasoconstriction is mainly mediated by α 1-receptors. Vasopressors are usually using in obstetrics primarily include directly acting selective α 1 receptors agonists, phenylephrine, and methoxamine, and both, directly and indirectly, acting such as mephentermine, metaraminol and ephedrine. However, some vasopressors can also stimulate β 1- and or β 2-receptors directly or indirectly, leading to a positive inotropic effect. Adrenaline is a synthetic alkaloid that is almost similar to the secretion of the natural adrenaline medulla, having the effect of reducing local blood flow, decreasing the rate of absorption of local anesthetics, and extending its local effect. One effect of administering local anesthetics that contain adrenaline is a change in blood pressure between before and after the administration of local anesthetics due to hypotension due to the vasodilation of the blood vessels.^{3,13}

In table 2 the mean change in systole from the Pre-post-delivery of vasoconstrictor sample shows a decrease systole of 13.25 mmHg with the difference in post and pre systole difference in anesthesia the largest sample difference and the smallest difference of 16,24318 mmHg.

Table 2. Hemodynamics Changes Lidodex Without Vasoconstrictor

Pre-post of Without vasoconstrictor	
Systole (N)	56
Mean	-11,9286
Standard deviation	17,80690
Significance	0,814
Diastole (N)	
Mean	-13,8929
Standard deviation	14,98081
Significance	0,378
Heart Rate (N)	56
Mean	-5,6429
Standard deviation	12,66409
Significance	0,786

*This sample has through the normality of Saphiro-Wilk data distribution is normal. And tested by independent T-test.

*p > 0.05 not significant

* Lidodex without vasoconstrictor more stable in hemodynamics changes than Lidodex given by vasoconstrictor to prolonged duration.

Table 3. Hemodynamics Changes Lidodex With Vasoconstrictor

Pre-post delivery of vasoconstrictor	
Systole (N)	12
Mean	-13,2500
Standard deviation	16,24318
Significance	0,814
Diastole (N)	
Mean	-18,2500
Standard deviation	17,52466
Significance	0,378
Heart Rate (N)	
Mean	-4,5000
Standard deviation	15,53588
Significance	0,786

*This sample has through the normality of Saphiro-Wilk data distribution is normal. And tested by independent T-test.

*p > 0.05 not significant

* Lidodex without vasoconstrictor more stable in hemodynamics changes than Lidodex given by vasoconstrictor to prolonged duration.

In contrast, in the table 2, Pre-post of hemodynamics without vasoconstrictor, the mean change in systole decreased by

11,9286 mmHg with the difference in pre and post systole difference in anesthesia the largest sample difference and the smallest difference is 17,80690 mmHg. Both samples tested by the independent T-test, obtained significance of 0.814, P>0.05, which means there was no significant difference between the two groups. And diastole from the Pre post-delivery of vasoconstrictor sample shows a decrease systole of 18.25 mmHg with the difference in post and pre diastole difference in anesthesia the largest sample difference and the smallest difference of 17.52466 mmHg. In contrast, in the Pre-post of hemodynamics table without vasoconstrictor, the mean change in diastole decreased by 13.8929 mmHg with the difference in pre and post diastole difference in anesthesia the largest sample difference, and the smallest difference is 14.98081mmHg. Both samples tested by the independent T-test, obtained significance of 0.378, P>0.05, which means there was no significant difference between the two groups. And heart rate from the Pre post-delivery of vasoconstrictor sample shows a decrease heart rate of 4.5 mmHg with the difference in post and pre systole difference in anesthesia the largest sample difference and the smallest difference of 15.53588 mmHg. In contrast, in the Pre-post of hemodynamics table without vasoconstrictor, the mean change in heart rate decreased by 5.6429 mmHg with the difference in pre and post heart rate difference in anesthesia the largest sample difference, and the smallest difference is 12.66409 mmHg. Both samples tested by T independent test, obtained significance of 0.786, p>0.05, which means there was no significant difference between the two groups.

In this study, there was a change in pulse with a decrease of 4.5 in the addition

of vasoconstrictors and a decrease in 5.6436 without the addition of vasoconstrictors. And for a comparison of the two obtained in this study, there were hemodynamic changes in post blood pressure and pre-induction of anesthetic drugs with additional vasoconstrictors in cesarean section using spinal anesthesia block techniques. Then both of them were compared to changes through independent sample T-test and obtained $P\text{-value} > 0.05$ which means that there was no significant change and there were no significant differences in this matter different from the research conducted by Pindet, et al, because there were other factors not yet examined. The number of samples dependent and independent is quite different for the sample.^{7,8}

CONCLUSIONS

In conclusion, the present study showed there were an addition of adrenaline to spinal anesthesia in cesarean section patients was not caused significant hemodynamic (blood pressure and heart rate) changes.

ACKNOWLEDGMENT

The authors would like to deliver gratitude to doctors, residents, and staff in the Faculty of Medicine, Universitas Airlangga, and Dr. Soetomo General Hospital, Surabaya, Indonesia, for their assistance and advice in running this research.

Conflict of Interest

There is no conflict of interest and funding in the writing of this article.

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