HEMODYNAMIC STABILITY AND RECOVERY TIME OF PROPOFOL AND SEVOFLURANE IN ULIN GENERAL HOSPITAL BANJARMASIN

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Abstract: ***The main interest in general anesthesia is safety and the well being of the patient especially the stability of hemodynamic during induction until extubation.*** *The most common causes of prolonging awakening are residual effects of drugs either anesthetics, sedatives, and analgesics. This study aimed to compare hemodynamic stability and recovery time between propofol and sevoflurane at Ulin General Hospital Banjarmasin. This was an observational analytic study conducted in July until November 2016 on 31 patients. The result showed that mean systolic blood pressure, diastolic blood pressure and heart rate for 90 minutes maintenance were no significant difference in group-A (propofol) compare with group-B (sevoflurane), post hoc Bonferroni test showing p>0.05. Mean recovery time to consciousness was faster in group-A (10,46 minutes) than group-B (15,59 minutes), there was no significant difference in two group. In conclusion, there was no significant difference in hemodynamic stability and recovery time between propofol and sevoflurane.*

Keywords*: hemodynamic stability, recovery time, propofol, sevoflurane.*

INTRODUCTION

The safety of patients during general anesthesia is a major concern, especially for hemodynamic stability, from the beginning of induction to the end of extubation. An inadequate depth level of anesthesia leads to hemodynamic changes that can be assessed through blood pressure and heart rate. Hemodynamic changes may not be harmful to healthy people, but can be dangerous in high-risk patients such as hypertensive patients, increased intracranial pressure, and heart problems.[1,2]

Recover consciousness is the return of patient awareness of general anesthesia ideally should be smooth and gradual in a controlled state. Delayed conscious delays occur when the patient fails to regain consciousness within 30-60 minutes, this may occur as a result of residual effects of anesthetic, sedative and analgesic drugs. The delay in recovering conscious feared cause sequelae such as *postoperative cognitive dysfunction* (POCD) should be managed appropriately.[3,4,18]

Propofol includes hypnotic agents for induction and maintenance of anesthesia intravenously. Sevoflurane is an inhalation hypnotic agent that is volatile. [1]

Bastola et al. Studied the comparative evaluation of propofol, sevoflurane and desflurane in supratentorial craniotomy patients with sevoflurane results having a higher heart rate and longer anesthetic recovery. Shah et al. Revealed the results of research in the form of sevoflurane conscious recovered time faster than propofol. Rawal et al reported a comparison of propofol average arterial pressure of 1% 10 mg/ml with sevoflurane 8% against measurement before induction, 1.3.5 min after induction resulting in a lower mean propofol arterial pressure than sevoflurane in 108 elective surgical patients.[5,6,7]

Enturk et al on comparison of propofol 2 mg / kg with sevoflurane 1-2.5% O_2 / N_2O 40% / 60% in patients with thoracic surgery with one lung ventilation with the conclusions of propofol lower heart rate than sevoflurane and pH, PO_2 , PCO_2 sevoflurane lower than propofol in blood gas analysis. Other studies on the comparison of anesthetic agents are similar to those of several different patient conditions such as laparoscopy, hypertension indications of LMA and spinal surgery.[6,8-10]

Smith et al reported the lower cost of sevoflurane anesthesia than propofol in patients *one day care* with a mean duration of 35 minutes. Chandra in his thesis concludes the total cost of the anesthetic propofol *target controlled infusion* (TCI) is lower than isoflurane with a mean duration of 170 and 200 minutes. Gocke et al reported the cost of propofol anesthesia with desflurane was no different in patients with an average duration of 80 minutes.[11-13]

Research on the comparison of hemodynamic stability and conscious recovering time between propofol and sevoflurane has never been done in Banjarmasin. Ulin General Hospital Banjarmasin is the largest hospital that receives regional referrals. The researchers were interested in doing a study on the ratio of blood pressure, heart rate and recovered conscious time between propofol 10-8-6 mg/kg / hr with 2% sevoflurane in general anesthesia patients at Ulin General Hospital Banjarmasin.

RESEARCH METHODS

This study was an observational analytic with a cross sectional method. The sampling technique is consecutive sampling, the population of which met the inclusion criteria: patients aged 18-60 years old, patients with ASA physical status I or II, digestive or gynecological patient elective surgery with GA action and exclusion criteria: refuses included studies. The sample size was 31 people consisting of 15 patients group A (propofol), 16 patients group B (sevoflurane).

This study was conducted after the approval of ethics from the Faculty of Medicine, University of Lambung Mangkurat. Patients with ASA I and II randomly divided the permutation block into two groups. Groups A and B mounted *non-invasive* monitor, *iv line* 2 lines, recorded blood pressure and heart rate. After all the patient's finished preparation in pre oxygenation 100% for 5 minutes. Give fentanyl 2 mcg / kg iv then injected propofol 2.5 mg / kg / iv for 15 seconds, and rocuronium 0.6 mg / kg iv Maintenance with propofol 10 mg / kg / h during the first 10 minutes, 8 mg / kg / hour 10 min, 6 mg / kg BW / hour thereafter and maintained for group A and MAC 2% vol for group B. Rocuronium 0.1 mg / kg every 30 min. TD and LJ values, 5 min after induction and every 15 min to 90 min. Giving morphine 0.1 mg / kg BB after intubation. Neostigmine 0.07 mg/kg and atropine 15 μg / kg before termination of anesthetic drugs.

Systolic blood pressure, diastolic blood pressure, heart rate recorded before induction, 5 minutes, 15 minutes, 30 minutes, 45 minutes, 60 minutes, 75 minutes and 90 minutes during the duration of anesthesia were then compared between the two groups. The recovered conscious time is recorded since the termination of the drug until the patient meets the Aldrete criterion, the value of ≥ 8.

Analysis of the data in this study using a test GLM (general linear model) post hoc Bonferroni's hemodynamic stability and unpaired t test for recovery time conscious and will be treated with *S*PSS 21 *for Windows.* This research was conducted in RSUD Ulin Banjarmasin for 6 months, from July 2016 - November 2016.

RESULTS AND DISCUSSION

Measurement of systolic blood pressure was performed at minute 0 or before induction, 5th, 15th, 30th, 45th, 60th, 75th and 90th minutes after induction. The observation of systolic blood pressure can be seen in Figure **1.**

Data conducted by Shapiro Wilk normality test and the test continued general linear model for all *post hoc Bonferroni* TDS measurements. TDS of the 15th minute of group A and group B had significant differences (p = 0.015) and 45 minute TDS also had significant differences (p = 0.022).

Diastolic blood pressure measurements were performed at minute 0 or before induction, 5th, 15th, 30th, 45th, 60th, 75th and 90th minutes after induction. The observation of systolic blood pressure can be seen in Figure **2.**

Data conducted by Shapiro Wilk normality test and the test continued general linear model for all post hoc Bonferroni TDD measurement. TDD 15th minute group A and group B had significant differences (p = 0.001).

Propofol picks the cardiovascular effects of lowering systemic vascular resistance, vasodilators, inhibition of myocardial contractility, and lower pre-load without offset by an increase in cardiac output so that a lower mean arterial pressure of 15-40% compared to thiopental. [1,19,20] The group A and group B using propofol 2 to 2.5 mg / kg for induction, there was no significant difference between the two groups at minute 5, although compared with the blood pressure before induction decreased due bolus propofol activity for at that minute the sample is in a pre-oxygenated state, which has not been associated with propofol continuous or inhalation. TDS and TDD minute 15 had significant difference value, where group A was lower than group B. At minute 15, intubation and propofol continuous or sevoflurane inhalation had entered. The maximum dose is used for the continuous 10 mg/kg BW / h and 2% sevoflurane. Shah et al. In his study of doses of propofol (75 - 125 μg / kg BB/min) patients' blood pressure were lower than dose (1-1.5%).[6]

In the 30th minute until the 90th group A of the propofol dose was lowered and maintained in 6 mg / kg BW / h and group B 2% vol. There was no significant difference in blood pressure between the two groups. Entruk et al in their study, mean arterial blood pressure of induction, 1 min and 30 min after *two lung ventilation*, showed no significant difference between propofol (125-250 ug/kg / min) with sevoflurane (1 to 2.5%) . [8] Fredman et al concluded intraoperative mean arterial pressure between propofol doses (75-160 mcg/kg / min) with sevoflurane (1-2%) there was no significant difference, because the agents to lower systemic vascular resistance.[14]

Bastola et al concluded there was no significant difference in mean arterial pressure between propofol, sevoflurane and desflurane, although there were significant values at some points such as pin time, 90 min and 150 min time where the blood pressure value of propofol (5-10 mg/kg BW / h) is higher than sevoflurane (1 - 2%). [5] In line with the research Bastola et al, the time of observation in some samples of group An increased blood pressure was very high in some episodes. Not only that, there is also a decrease in blood pressure is very low so should be added drugs vasoconstrictor. Unlike the case with group B, although there are a spike and decrease still in the range that does not need to be given the act of adding other drugs.

Heart rate measurements were performed at minute 0 or before induction, 5th, 15th, 30th, 45th, 60th, 75th and 90th minutes after induction. The results of heart rate observation can be seen in Figure 3.

Data conducted by Shapiro Wilk normality test and the test continued general linear model for all *post hoc Bonferroni* LJ measurement. There was no significant comparison of heart rate between the two groups ($p > 0.05$).

Group B heart rate was lower than group A of figure 3 although there was no statistically significant difference ($p > 0.05$). Fredman et al say there are no significant differences in heart rate between propofol with sevoflurane when *maintenance*, although the value of heart rate lower than the sevoflurane group propofol. This is because sevoflurane leads to direct inhibition of the β-adrenoreceptor system.[14] Contrary to many studies that say that the heart rate is higher than propofol sevoflurane on such research Shah et al, Bastola et al, and Enturk et al.[5,6,8]

Rawal et al in the discussion said propofol causes a decrease in the sympathetic nerves and is likely to decrease cardiac parasympathetic activity. A decrease in blood pressure will be offset by an increase in heart rate. The decrease in heart rate in propofol at induction is a negative kronotropic effect rather than the stimulation of the parasympathetic heart. Sevoflurane inhibits sympathetic activity without making significant changes in the parasympathetic. Baroreflex control of heart rate will be inhibited, so the heart rate will not increase during hypotension. This is what causes the heart rate sevoflurane lower than propofol.[7]

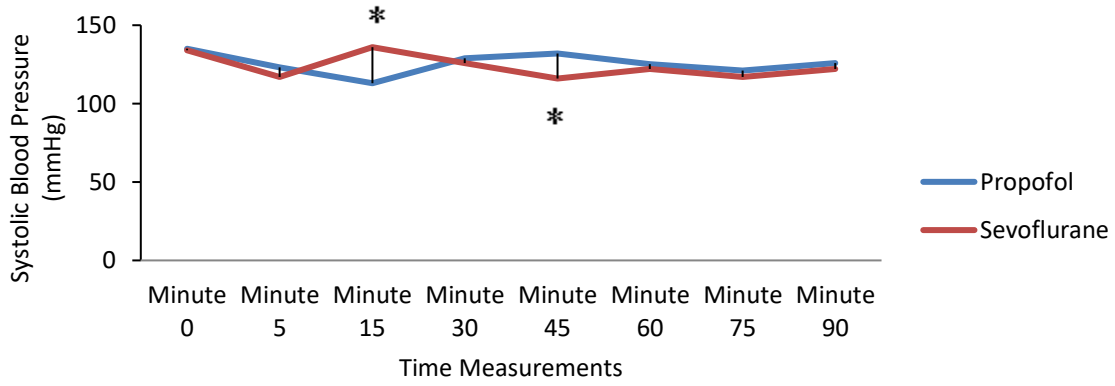

Figure 1 Comparison of systolic blood pressure by an average of the group given the anesthetic propofol and sevoflurane anesthesia, *significant difference, p <0.05 *GLM post hoc Bonferroni*

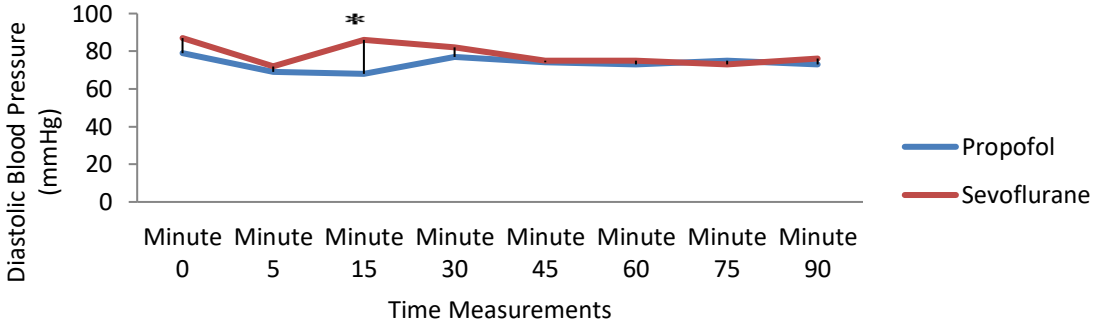

Figure 2 Comparison of diastolic blood pressure based on the average in the group given the anesthetic propofol and sevoflurane anesthesia, *significant difference, p <0.05 *GLM post hoc Bonferroni*

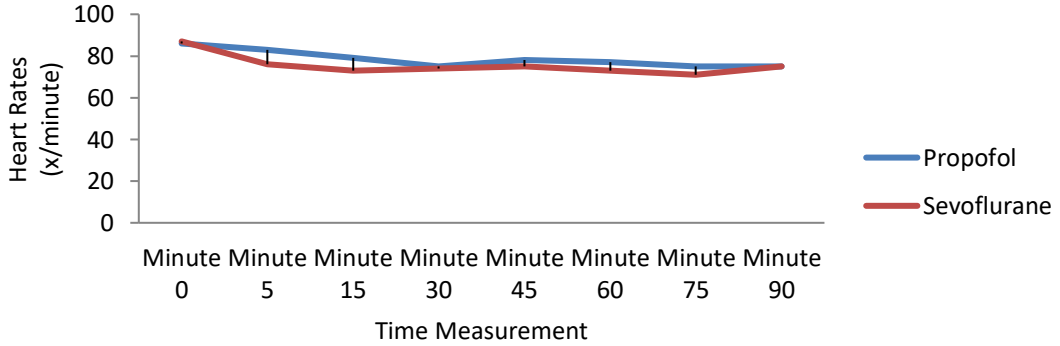

Figure 3 Comparison of average heart rates in the group given propofol anesthesia and sevoflurane anesthesia

Opening time of group A with a span of 27 seconds - 9 minutes 33 seconds, average 6 minutes 48 seconds faster than group B with a span of 22 seconds - 18

minutes 4 seconds, average 10 minutes 20 seconds. Recovered conscious time assessed from the A group Aldrette criteria (Propofol) with a range of 5 minutes 50 seconds - 17 minutes 28 seconds, mean 10 minutes 46 seconds faster than group B (Sevoflurane) span 4 minutes 50 seconds - 25 minutes, average 15 minutes 59 seconds. Testing normality's data were normally distributed (p = 0.603). The data were then tested by unpaired T test, with the result (p = 0.127), there was no significant difference in recovered conscious time between the two groups.

Gupta et al in a systematic review mention that research Fredman et al and Smith et al, concluded there was no significant difference between propofol with sevoflurane *intermediate* to *early recovery* and *recovery*. Lansen et al propofol faster *early recovery* and have better cognitive function. [15] Bastola et al, there are significant differences in time obey orders where propofol (5.3 ± 2.9) minutes faster than sevoflurane (8.0 ± 2.9) minutes.[5] Hwan et al study meta-analysis comparison between propofol with sevoflurane cholecystectomy laparoscopy surgery, both anesthetic agent that has a good effect on hemodynamic stability and fast recovery time. However, the use of TCI is better because of faster recovery time and lower PONV effects. [16]

In contrast to Shah et al's study, the opening time of sevoflurane (2.86 ± 0.66) was significantly faster than propofol (5.41 ± 0.99). The timing of obeying orders also significantly faster sevoflurane (3.18 ± 0.72) than propofol (5.89 ± 0.99). [6] Gupta et al in its systematic review 7 data research conclusions of 11 said that sevoflurane better on *early recovery* compared to propofol. [15]

Recovered consciousness from general anesthesia is a time of severe physiological stress in the majority of patients. The return of patient awareness of general anesthesia ideally should be smooth and gradual in a controlled state. A conscious recovering delay occurs when the patient fails to regain consciousness within 30-60 minutes. After long surgery, 60-90 minutes should be given a stimulus for the patient back conscious. [3,4,17]

Clinically, propofol as a smooth and rapid induction anesthetic agent for the patient is sought, as propofol maintenance has a stable hemodynamic stability such as sevoflurane. Time recovers conscious propofol (10 minutes 46 seconds) faster than sevoflurane (15 minutes 59 seconds), faster consciousness returns with minimal residue from CNS. Propofol had minimal post operative effects on the response of nausea and vomiting, during group B observation there were 2 vomiting samples while in the conscious recovered chamber, whereas group A was absent, but the time the patient had vomiting was not recorded. Propofol also has a better cognitive function, when the researcher has asked a number of questions to 1 group A sample and 1 group B sample, group A responds in minutes faster than group B. The use of propofol is more environmentally friendly than inhalation because does not cause gas pollution in the operating room. Farmakoekonomi propofol cheaper than sevoflurane, such as research Cjandra et al said the cost of propofol is cheaper than inhalation on the average anesthesia duration of 170 minutes.[14]

CONCLUSION

From the research that has been done, it can be concluded that the blood pressure between propofol anesthesia with sevoflurane anesthesia is the same, but at minute 15 there is a significant difference. Cardiac rates between propofol anesthesia and sevoflurane anesthesia were not significantly different. Hemodynamic stability between propofol was as effective as sevoflurane in the first 90 minutes of anesthesia. Another conclusion is that the recovered time of propofol anesthesia (10.46 min) was faster than sevoflurane anesthesia (15.59 min), statistically, this difference was not significant.

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