

A Prospective Observational Study of Plethysmograph Variability Index and Perfusion Index in Predicting Hypotension with Propofol Induction in Noncardiac Surgeries

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Context:

Propofol induction is associated with hypotension due to changes in intravascular volume, tone of vessels and cardiac output. Plethysmograph variability index (PVI) and perfusion index (PI) are derived indices from pulse oximeter, used for assessing fluid responsiveness and vessel tone, respectively. We studied the utility of these indices in predicting hypotension due to propofol.

Aims:

The aim of the study is to test the baseline cutoff values of PVI > 15% and PI <1.05 in predicting hypotension with propofol induction.

Settings and Design:

This is a prospective double-blind observational study in tertiary care hospital.

Methods:

Institutional ethical committee approval was obtained. 106 surgical in-patients as per inclusion and exclusion criteria were randomly allotted by computer-generated random numbers. All patients were nil by mouth for 6 h. Injection midazolam and fentanyl were used as premedicants. Propofol at dose of 2 mg.kg⁻¹ was used for induction. Masimo Radical 7[®] monitor was used for recording of PVI and PI from the upper limb. Baseline values of PVI and PI were recorded every minute from preinduction period till intubation. Standard monitors of noninvasive blood pressure, pulse oximeter, and electrocardiography were used. As per the occurrence of hypotension, patients were grouped as Group H (hypotension) and Group NH (no hypotension).

Statistical Analysis:

Data were analyzed with SPSS version 20. Quantitative data were analyzed using mean, standard deviation, interquartile range as per distribution. Shapiro–Wilk test with $P < 0.001$ was used descriptive parameters. Scatter plot and Spearman correlation were used to find correlation between the two variables. Mann–Whitney U test was used to compare the two groups in terms of PVI and PI at different time points. Receiver operator characteristic curve was plotted for PI and PVI against hypotension, and cutoff value was calculated. Sensitivity, specificity, positive predictive value, negative value, and diagnostic accuracy of PI and PVI were calculated. $P < 0.05$ was considered statistically significant.

Results:

Eighty-one patients (76.4%) who had hypotension were grouped into Group H and 25 patients (23.6%) without hypotension as Group NH. There was no difference between groups with respect to doses of midazolam ($P = 0.28$), fentanyl ($P = 0.54$), and propofol ($P = 0.28$). Baseline cutoff of PVI >15 had sensitivity of 58% and specificity of 56%, respectively. PI cutoff value of < 1.05 had sensitivity of 30.9% and specificity of 48%. The risk ratio of PVI cutoff and PI cutoff were 1.41 and 0.43, respectively. There was poor agreement between mean arterial blood pressure (MAP) estimation and prediction of

hypotension by PVI (Cohen's kappa = 0.106, P = 0.218) and PI values (Cohen's kappa = -0.133, P = 0.054). Area under the receiver operator curve was 0.596 and 0.511 for PVI >15% and PI < 1.05, respectively. New cutoff values PVI >17.5% and PI > 0.76 were found. PVI and PI had poor diagnostic performance. There was no significant correlation of PVI and PI with hemodynamic variables such as heart rate, MAP, SBP, DBP, and PP.

Conclusion:

Baseline values of PVI >15% and PI < 1.05 are not good tools for predicting hypotension with propofol induction. New values of baseline cutoff of PVI >17.5% have high specificity, and PI > 0.76 has high sensitivity and positive predictive value.