

Perfusion Index and Pleth Variability Index after Administration of General Anesthetic Agents.

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Background

Generally, anesthetic agents dilate peripheral vessels and increase peripheral perfusion by inhibiting the sympathetic nervous system. Respiratory variations in the pulse oximetry photoplethysmographic waveform amplitude have been shown to correlate with changes in ventricular preload and prediction of fluid responsiveness in anesthetized mechanically ventilated patients. Recently, a new noninvasive device (Radical-7 pulse oximeter monitor, Masimo Corp., USA) has been introduced that continuously detects changes in the photoplethysmographic waveform and computes a Perfusion Index (PI) reflecting peripheral perfusion and a Photoplethysmogram Variability Index (PVI) reflecting fluid status and preload. In this study, we investigated the changes in PI and PVI before and after administration of general anesthetic agents.

Methods

Adult patients with unpremedicated ASA I and II underwent selective operations under general anesthesia. The method of general anesthesia was decided by each anesthesiologist. The pulse oximeter sensor was placed on the index finger of the upper limb without blood pressure cuff. We prospectively recorded study data before administration of general anesthetic agents and before tracheal intubation or insertion of laryngeal mask (LMA). Study data included hemodynamic measurement such as systolic blood pressure (sBP), heart rate (HR) and oxygen saturation by pulse oximetry (SpO₂) as well as PI and PVI. Fluid was administered continuously at 10 mL/kg/hr during the anesthesia induction. The cases with administration of vasoactive agents and atropine were excluded from this study.

Results

Twenty one patients (46 ± 15 yrs old, M/F = 11/10) underwent operations under general anesthesia. Nineteen patients were tracheally intubated and 2 patients were inserted LMA in. Time interval before administration of general anesthetic agents and before tracheal intubation or insertion of LMA was 7 ± 2 min. After administration of general anesthetic agents, sBP significantly decreased from 142 ± 29 to 104 ± 26 mm Hg ($p < 0.001$), HR did not significantly change from 75 ± 11 to 71 ± 13 beats/min, and SpO₂ significantly increased from 99.0 ± 1.2 to $99.6 \pm 0.7\%$ ($p < 0.05$) PI significantly increased from 2.1 ± 1.7 to 3.8 ± 2.3 ($p < 0.001$) and PVI significantly decreased from 22.9 ± 8.1 to 17.1 ± 7.2 ($p < 0.05$).

Conclusions

Our results indicate an increase in peripheral perfusion and improvement of fluid status and preload after administration of general anesthetic agents and intravenous fluid administration during anesthesia induction.