

Can the Starting Pulse Oximeter-Derived Pleth Variability index (PVI) Predict Total Crystalloid Replacement during Isovolemic Hemodilution in Congenital Cardiac Surgery?

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Introduction

Recent evidence shows the possible advantage of using changes in Plethysmography Variability Index (PVI) to guide fluid management intraoperatively in the adult population. A recent study suggested that the use of PVI as a guide for fluid management during major abdominal surgeries has resulted in significantly lower volume administration and was associated with lower lactate level as a measure of better perfusion. In this prospective study, we evaluated the correlation between the starting PVI and the total volume replacement during our routine isovolemic hemodilution in pediatric patients undergoing congenital cardiac surgery. Our hypothesis is that patients with PVI number > 14 would require larger volume replacement to achieve the same hemodynamic stability when compared with patients with a starting PVI <14.

Methods

After institutional board (IRB) review and approval, a total of 40 patients who were scheduled for congenital cardiac surgery utilizing Cardio Pulmonary Bypass (CPB) were enrolled. After induction of general anesthesia and placement of standard ASA monitors, the Masimo pulse oximeter (Masimo Co., Irvine, California) was placed on the patient's finger. Perfusion index (PI) and Plethysmography Variability Index (PVI) were recorded for each patient. Other data collected included patient's age, weight, drugs used during the case, lactate, blood pressure, total pre-cardiopulmonary bypass fluids administered and cerebral oxygen saturation. All data were recorded at two time points; the first was at baseline before isovolemic hemodilution and the second time point was after hemodilution.

Results

A total of 35 patients were included in the final cohort due to technical problems with data for five patients. The patients were divided into two groups. Group 1 (patients with starting PVI less than 14) included 24 patients. Group 2 (patients with starting PVI value more than 14) included 11 patients (Table 1). The average crystalloid replacement in group 1 was 5ml/kg, while volume replacement in group 2 was 11ml/kg in order to maintain the same hemodynamics during hemodilution (Figure1).

Discussion

This preliminary data demonstrates the possible advantage of using the PVI value as a tool for identifying patients who would be good candidates for isovolemic hemodilution. In addition, monitoring changes in the PVI could be used as a guide during volume replacement during isovolemic hemodilution in pediatric patients undergoing congenital cardiac surgery.

References: 1 Patrice Forget, M. (2010). *Anesthesia and Analgesia*, 910-914.