

Monitoring of plethysmography variability index and total hemoglobin levels during cesarean sections with antepartum hemorrhage for early detection of bleeding.

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Abstract

Background

Cesarean sections for parturients with antepartum hemorrhage have the potential risk of massive blood loss. In the current study we investigated the use of Plethysmography variability index (PVI) and non invasive hemoglobin (SPHB) monitoring as well for intraoperative detection of blood loss and intravascular volume status.

Methods

One hundred and twenty four full term parturients scheduled for elective CS were included in the study. All patients received general anesthesia after preoxygenation for 5 min, rapid-sequence induction performed with thiopental 3–5 mg/kg and suxamethonium 1.5 mg/kg; Anesthesia was maintained with a 100% of oxygen with 0.5–1 MAC of isoflurane and atracurium 0.5 mg/kg. Standard monitors (pulse oximetry, non-invasive blood pressure, and ECG) were applied. Masimo sensor was applied following best practice guidelines, and automated data collection (ADC) was done. Our primary outcome was to compare PVI values before versus after administration of fluids and blood that was given based on clinical data. Our secondary outcome was to review of SPHB traces plots to determine if and when SPHB may have detected presence of anemic state or critical drop in hemoglobin level when compared to time of clinical awareness of bleeding and confirmation by lab Hb sample measurement.

Results

PVI showed a significant negative correlation with CVP ($p = 0.037$) and a significant negative correlation with MAP ($p = 0.01$). Also, it showed significant positive correlation with HR ($p < 0.001$). A highly significant Correlation was found between pre transfusion lab Hb and pre transfusion SpHb ($p < 0.001$). Also post transfusion values showed a highly significant correlation as well ($p < 0.001$). A total of 87 transfusions (91.58%) were found unnecessary when using SpHb as the reference, compared to 58 (61.05%) when using the invasive laboratory measurement.

Conclusion

Plethysmography variability index and non invasive hemoglobin monitoring as well can be used for optimization of intravascular volume status during cesarean sections in parturients with antepartum hemorrhage.