

Pleth Variability Index as a Tool for Volume Optimization during Open Abdominal Surgery

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Background and Goal of Study

Stroke Volume Optimization using Esophageal Doppler (ED) is an established method to optimize preload during abdominal surgery (1). The technique is costly and sensitive to interference, requires training and is not possible in prone position or at limited access to the head. We studied if volume optimization using the simpler pulse oximetric technique Pleth Variability Index (2) would lead to similar fluid treatment.

Materials and methods

After ethical permission 75 adult patients ASA 1-3 scheduled for elective open abdominal surgery with an expected duration of at least 2 hours were randomized to volume optimization guided by ED or PVI. Exclusion criteria were amongst others hepatic resection and severe cardiac arrhythmias. All patients received a baseline infusion of 2 ml/kg/h dextrose solution. Preoperative dehydration was corrected with Ringer-acetate. All patients were ventilated with a tidal volume of 7 ml/kg ideal bodyweight. In the ED group stroke volume was maximized using 3 ml/kg boluses of colloids (1) while simultaneously acquired PVI measurements were concealed. In the PVI group boluses of colloids were administered when PVI > 10% (3) and the parallel ED readings were concealed. Bleeding was substituted 1:1 with additional colloids including blood products.

Results and discussion

Thirty-five patients were analyzed in the PVI group and 39 in the ED group. Surgical time was mean(SD) 373(270) min for PVI and 348(329) min for ED ($p=0.73$). There was no difference in colloid volume given in connection with induction and the following volume optimizations during surgery between the two groups ($p=0.38$; repeated measures ANOVA) (Fig 1). The total volume of fluids given during surgery was mean(SD) 2663(1730) ml for PVI and 2809(1938) ml for ED group ($p=0.71$). Lactate level at the end of surgery was 1.8(0.9) and 1.7(0.9) mmol/L, respectively ($p=0.71$). [Fig 1] Conclusion(s): Fluid optimization during open abdominal surgery guided by PVI seems to result in equal amounts of fluid administered compared to guidance using ED technique.

References

1. *J Am Coll Surg* 2008;207(6):935-41
2. *Anesth Analg* 2010;111:910-4
3. *Anesth Analg* 2011;113:1058-63

