

Phenylephrine Bolus Given To Treat Hypotension Decreases Cerebral Oxygen Saturation

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Introduction: Cerebral oximetry (ScO₂) is emerging as a potentially useful tool to help assess cerebral perfusion. Vasopressors have been shown to decrease ScO₂ in some clinical situations.¹ This study was done to assess the effect of routine doses of a commonly used vasopressor, phenylephrine (PE), on ScO₂ during non-cardiac surgery.

Methods: 40 patients scheduled for an operative procedure requiring general anesthesia for non-cardiac or non-cerebrovascular surgery were recruited and signed informed consent. Inclusionary criteria included age 18-80 and no evidence of dementia or pre-existing cerebrovascular disease. 2–4 mg midazolam was administered for anxiolysis and baseline non-invasive blood pressure was obtained after assuring adequate anxiolysis. A FORE-SIGHT™ cerebral oxygen sensor (CASMed, Branford, CT) was placed according to the manufacturer's specification. Baseline cerebral oxygen saturation (ScO₂) was measured with the patient breathing room air. Cerebral oxygen saturation values every two seconds were internally maintained by the monitor as was a contemporaneous event log and both were downloaded for analysis following the procedure.

General anesthesia was induced with propofol 2 mg kg⁻¹, fentanyl 2 mcg kg⁻¹, rocuronium 0.5 mg kg⁻¹ and the trachea was intubated. Anesthesia was maintained with desflurane 4.5 to 7% end-tidal and fentanyl infusion of 1.6 mcg min⁻¹. Hypotension was defined as a decrease in systolic blood pressure of greater than 20% below baseline. Hypotension was treated with PE 100 mcg. If the heart rate was less than 60, 10 mg ephedrine was administered instead. If normotension was not restored, pressors were repeated as per protocol every two to ten minutes.

We reviewed the response to the first dose of pressor in each patient. Average ScO₂ in the minute prior to pressor administration was determined. For five minutes following pressor administration ScO₂ was considered by several methods. First, average ScO₂ was determined and compared to baseline. Second, maximal change from baseline was determined. Finally, the area under the ScO₂ curve (AUC) for five minutes compared to baseline was determined. The significance of the AUC was determined by considering whether or not the 95% confidence interval (CI) of the average AUC was different from zero.

Results: Of the 40 patients enrolled in the study, 10 were excluded: 8 did not receive pressors and 2 received ephedrine. The remaining 30 patients received PE. In all patients ScO₂ decreased below baseline during the subsequent 5 minutes (Figure, dark line is average). In 18 patients the greatest decrease was more than 5% below baseline. The AUC was negative for 27/30 patients: -3.60 ± 1.3 (median \pm 95% CI), significant as the 95% CI does not include zero.[figure1]Discussion: PE administration resulted in a ScO₂ decrease within 5 minutes. Whether this resulted from changes in cerebral blood flow or redistribution of blood between venous and arterial beds needs to be determined, as does the clinical significance of this finding.

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