Controlled Systemic Hypotension and Blood Loss During Fronto-orbital Advancement

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Abstract

Background: Controlled systemic hypotension is routinely employed during open repair of craniosynostosis to purportedly decrease blood loss (1), though this benefit remains to be proven. This study analyzed the relationship between intraoperative mean arterial pressure (MAP) and calculated blood loss (CBL) during fronto-orbital advancement (FOA) for craniosynostosis.

Methods: The authors reviewed the records of all infants with craniosynostosis who underwent primary FOA at a single institution from 1997–2009. Patient demographics were recorded. Anesthesia records provided operative time, preoperative MAP, and serial intraoperative MAP (every 5 operative minutes). Interval measures of CBL were determined by preoperative/intraoperative/postoperative hemoglobin values, when available, in conjunction with transfusion volumes. Longitudinal relationships between MAP_{mean}, MAP_{change}, CBL, and CBL_{change} were assessed over the same interval and compared between adjacent intervals (staggered analysis) to determine the directionality of associations.

Results: 90 infants (44 males, 46 females) underwent FOA at a mean age and weight of 10.7 months and 9.0 kg, respectively. Indications included metopic (N=36), unicoronal (N=32), and bicoronal (N=22) synostoses. Average operative time was 4.2 hrs and intraoperative MAP was 56.1 mmHg, 22.6% lower than preoperative baseline. Mean CBL was 39.3% of estimated blood volume (% EBV). A negative correlation was found between CBL and MAP_{mean} (r = -0.47, *p = 0.017*) over the same interval (**Figure 1**). A significant, inverse relationship was maintained between CBL_{change} of the previous interval and MAP_{change} of the next interval (r = -0.07, *p = 0.049*). Finally, no significant association was found between MAP_{change} of the previous interval and CBL_{change} of the next interval (r = -0.28, *p =0.12*).

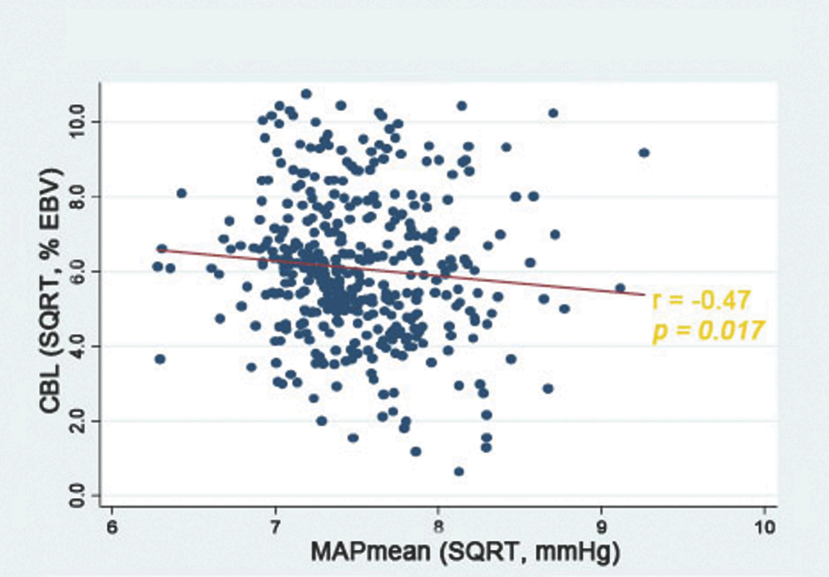

Figure 1. Relationship between CBL and MAP_{mean}.

Conclusions: In this study of controlled systemic hypotension during FOA for craniosynostosis, CBL demonstrated an inverse relationship with MAP. Nevertheless, directionality testing indicated that MAP did not affect intraoperative blood loss; instead, blood loss drove changes in MAP. Overall, these findings question the benefit of controlled systemic hypotension during complex open craniofacial repair and suggest that intraoperative blood loss may control systemic hypotension rather than vice versa.

References

1. Diaz JH, Lockhart CH; Hypotensive anaesthesia for craniectomy in infancy. Br J Anaesth; 51; 233-235; 1979.

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