

Use of Anesthesia Information Management System (AIMS) Data to Determine Factors Associated with Low Blood Pressure in Healthy Anesthetized Infants

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Introduction: Infants under six months of age have the highest risk of cerebral hypoperfusion during periods of low blood pressure.¹ We used AIMS data to study the hemodynamics of infants who received anesthesia for inguinal hernia repair. The primary aim was to determine the patient, anesthetic and surgical factors associated with low systolic blood pressure (SBP) in healthy infants. We hypothesized that infants who received a neuromuscular blocking agent would have significantly higher SBP than infants who did not receive a muscle relaxant.

Methods: ASA PS 1 and 2 patients aged 0-6 months who underwent inguinal hernia repair from January 2015 to March 2019 at CHOP were included. SBPs were analyzed during the preparation phase (20 minutes before procedure start) and the surgical phase (15 to 35 minutes after procedure start). Low SBP was defined as an SBP more than two standard deviations below the 50th percentile in phase- and weight-specific reference values for children under general anesthesia.² Data on patient and surgical characteristics, hemodynamics and perioperative medications was retrieved from the AIMS (Epic Anesthesia Module, Verona, WI).

Results: Of 280 included patients, 30 (11%) had low SBP during the preparation phase and 13 (5%) during the surgical phase. The majority of patients received neuraxial anesthesia (244 patients, 87.1%) which consisted of a caudal block in all but two patients who received spinals. During the preparation phase, after controlling for confounders, SBP decreased by 3.7 mmHg for each kg reduction in weight, and SBP decreased by 2.1 mmHg for each month younger in age (both $P < 0.001$). Weight had a stronger effect than age on SBP with a larger standardized regression coefficient (4.5 vs. 2.5). Similar associations were observed during the surgical phase. Patients given muscle relaxant had significantly fewer occurrences of low SBP during the preparation phase ($\beta = -1.89$ and $P < 0.001$). Urology patients had more occurrences of low SBP compared with general surgery patients during both phases ($\beta = 1.12$ and $P = 0.028$; $\beta = 2.68$ and $P = 0.010$).

Discussion: SBP displayed linear relationships with weight and age among healthy infants. Muscle relaxant use is associated with reduced doses of other anesthetic agents; this sparing effect likely has a positive effect on SBP.

Conclusion: Age and weight were linearly related to blood pressure in infants under anesthesia. The use of muscle relaxant was associated with fewer low blood pressures.

References:

1) Rhondali O, et al. Impact of sevoflurane anesthesia on cerebral blood flow in children younger than 2 years. *Paediatr Anaesth* 2013; 23:946-51

2) de Graaff JC, et al. Reference values for noninvasive blood pressure in children during anesthesia: a Multicentered Retrospective Observational Cohort Study. *Anesthesiology*. 2016; 125:904-913

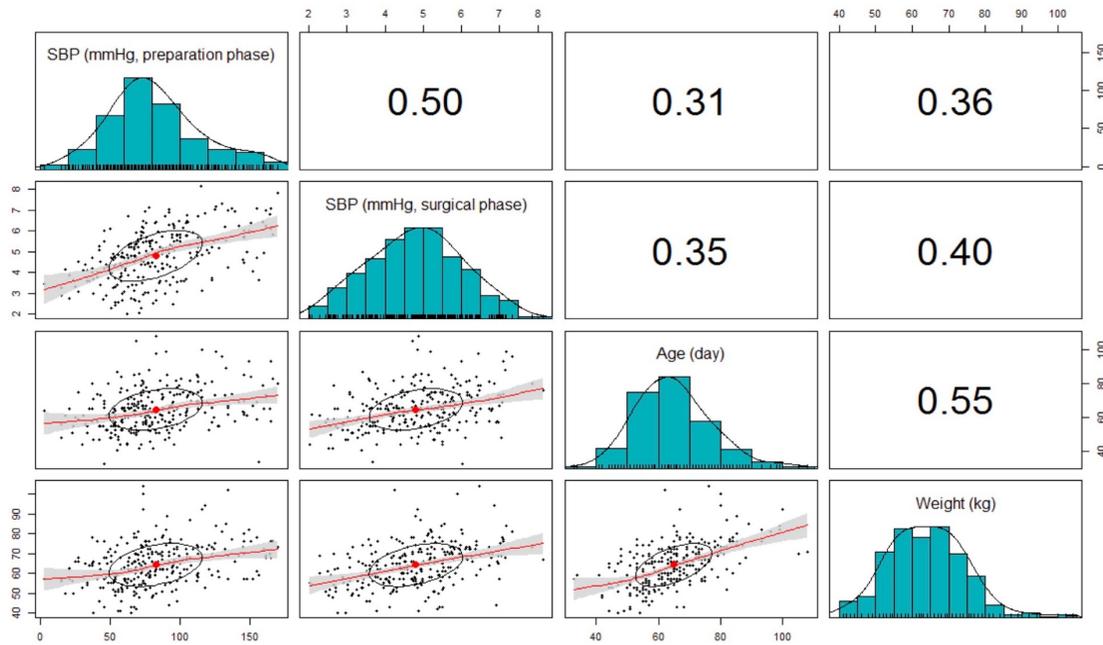


Figure 1. A matrix of correlation coefficients, histograms, and scatter plots among SBP, age, and weight.