

Citation

Posner KL: The POVL Study Group: A national sample of variation in blood pressure and anemia severity in spinal fusion surgery. *Anesthesiology* 111:A1013, 2009.

Abstract

Background

Ischemic optic neuropathy (ION) associated with major spine surgery in the prone position has led to significant speculation about possible causes, including intraoperative hypotension and anemia. Sparse data exists on the range of blood pressure (BP) and anemia severity for spinal fusion surgery. We report preliminary data from 100 spinal fusion operations not associated with postoperative visual loss (POVL) from an ongoing North American multicenter case control study of ION.

Methods

From a database of 43,410 spinal fusion operations from 17 academic centers, 320 controls without POVL were randomly selected and matched for year of surgery (1991 - 2006) to 80 ION spinal fusion cases in the American Society of Anesthesiologists POVL Registry. (1) Inclusion criteria were: 1) non-cervical spinal fusion operation in the prone position; 2) anesthetic duration ≥ 4 hrs; 3) age ≥ 18 yrs. Exclusion criteria were: 1) any perioperative cardiopulmonary resuscitation; 2) new complaint of POVL; 3) stroke; and 4) incomplete medical records. We report preliminary data from 100 controls randomly selected from the 320 controls without POVL. Data for this analysis consisted of preoperative hematocrit (hct), lowest intraoperative hct, and intraoperative BP at 5 minute intervals. Clinic BP was used as the baseline to measure intraoperative BP decreases. BP levels (ranges and % below baseline) were analyzed in intervals of 15 (nonconsecutive) minutes. Statistical analysis of clinic and day of surgery preoperative BP differences was performed using paired t test.

Results

There was no significant difference between clinic (94 mm Hg) and day of surgery (95 mm Hg) preoperative mean arterial blood pressure (MAP, $p = 0.275$) in the 100 control patients. The mean preoperative hct was $38.9 \pm 5\%$ and mean lowest intraoperative hct was $30.7 \pm 5.9\%$. The range of lowest recorded intraoperative hct values was 19 to 46%. Using clinic MAP as baseline, over half of the 100 controls without POVL had the lowest MAP $\geq 30\%$ below baseline, and 38% had the lowest systolic BP (SBP) < 90 mm Hg for a minimum of 15 (nonconsecutive) minutes. The longest duration of SBP < 90 mm Hg in a single control patient was 190 minutes. [table1] CONCLUSIONS: This is the first large multicenter study to examine the variation in lowest intraoperative BP and anemia severity for prone spinal fusion surgery across North America. The intraoperative BP and hct for prone spinal fusion surgery in control patients without POVL varies widely. Future analyses of this case control study may elucidate risk factors for the development of ION.

(1) Lee LA, et al. The American Society of Anesthesiologists' Postoperative Visual Loss Registry: Analysis of 93 Spine Surgery Cases with Postoperative Visual Loss. *Anesthesiology* 105(4):652, 2006.

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Lowest Intraoperative Blood Pressure in 100 Controls without POVL			
% below MAP baseline	% of 100 controls without ION	Absolute SBP ranges	% of 100 controls without ION
≥ 10% below baseline	95%	SBP < 110 mm Hg	98%
≥ 20% below baseline	84%	SBP < 100 mm Hg	86%
≥ 30% below baseline	54%	SBP < 90 mm Hg	38%
≥ 40% below baseline	15%	SBP < 80 mm Hg	10%
≥ 50% below baseline	1%	SBP < 70 mm Hg	8%

Values are for a minimum of 15 (nonconsecutive) minutes; POVL, postoperative visual loss; SBP, systolic blood pressure

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