THIS MONTH IN
ANESTHESIOLOGY

31 Total Intravenous Anesthesia *versus* Inhalation Anesthesia for Breast Cancer Surgery: A Retrospective Cohort Study

Volatile anesthetic agents have been found to suppress natural killer cell activity, which is critical in preventing growth of cancer cells, and to induce upregulation of tumorigenic growth factors. In contrast, propofol has been reported to preserve natural killer cell activity and to have a protective anticancer effect. The hypothesis that there would be differences in recurrence-free survival and overall survival between patients who receive total intravenous anesthesia and those who receive inhalation anesthesia during breast cancer surgery was tested in a retrospective propensity matched cohort study of 1,766 patients who had intravenous anesthesia and 1,766 patients who had inhalational anesthesia for breast cancer surgery between 2005 and 2013. Kaplan-Meier survival curve analyses found 5-yr recurrence-free survival rates of 93.2% (95% CI, 91.9 to 94.5%) in the intravenous anesthesia group and 93.8% (95% CI, 92.6 to 95.1%) in the inhalation anesthesia group and respective 5-yr overall survival rates of 94.2% (95% CI, 92.9 to 95.5%) and 94.5% (95% CI, 93.3 to 95.8%). *See the accompanying Editorial View on page 3.*

(Summary: M. J. Avram. Illustration: A. Johnson, Vivo Visuals.)

72 Triple-low Alerts Do Not Reduce Mortality: A Real-time Randomized Trial

Triple-low events (mean arterial pressure less than 75 mmHg, Bispectral Index less than 45, and minimum alveolar fraction less than 0.8) are associated with postoperative mortality. The hypothesis that providing triple-low alerts will reduce 90-day mortality was tested in 7,569 patients who experienced triple-low events and were randomized in real time to either a control group in which triple-low events were electronically recorded but no alert was given or an alert group in which clinician alerts were generated through a clinical decision-support system. Clinicians were free to act on the alert, ignore the alert, or to consider the information provided without acting on it. The observed incidence of 90-day mortality was 8.3% in the alert group and 7.3% in the nonalert group, with a hazard ratio of 1.14 (95% CI, 0.96 to 1.35). Clinicians responded helpfully to about half of the triple-low events, with or without alerts. There was no apparent relationship between helpful responses and adjusted 90-day mortality in either group.

(Summary: M. J. Avram. Image: J. P. Rathmell.)

63 Cognitive Effects of Perioperative Pregabalin: Secondary Exploratory Analysis of a Randomized Placebo-controlled Study

Pregabalin has opioid-sparing and analgesic effects in the early postoperative period. The hypothesis that pregabalin, administered as part of a multimodal pain regimen, would affect executive functioning 24 h after surgery was tested in 80 patients scheduled for elective laparoscopic donor nephrectomy randomized to receive pregabalin, 150 mg, or placebo twice daily during two consecutive days beginning the morning of surgery. Cognitive function was measured using tests selected from the Cambridge Neuropsychological Test Automated Battery, which assesses different domains of cognitive functioning, including executive function, attention, and psychomotor speed. The pregabalin group had a significantly impaired performance in the test that assesses visuospatial working memory and strategic choices. The pregabalin group also had a significant increase in the number of errors in the test that measures impulsivity and inhibitory functions. While perioperative pregabalin significantly negatively affected subdomains of executive functioning compared to placebo, psychomotor speed was not changed.

(Summary: M. J. Avram. Image: ©ThinkStock.)

131 Analgesic Effects of Hydromorphone *versus* Buprenorphine in Buprenorphine-maintained Individuals

The factors that make buprenorphine, a partial μ-opioid receptor agonist with high receptor affinity and slow dissociation from it, an excellent opioid use disorder treatment can be barriers to effective acute pain management. The hypothesis that intravenous hydromorphone, a full μ-opioid agonist, would provide superior analgesia compared to intravenous buprenorphine and that both would provide analgesia that was superior to that of placebo was tested in a double-blind, placebo-controlled, crossover, cumulative dose study of 13 subjects maintained on sublingual buprenorphine/naloxone (12 or 16 mg) for opioid use disorder beginning approximately 17 h after their most recent dose. Quantitative sensory testing included the cold pressor test, which was used as the primary outcome of the study. Hydromorphone doses at or above the cumulative dose of 16 mg were sufficient to increase cold pressor threshold and tolerance compared to placebo. Intravenous buprenorphine had significant analgesic effects on cold pressor threshold, but these effects were less robust than those of hydromorphone.

(Summary: M. J. Avram. Image: J. P. Rathmell.)

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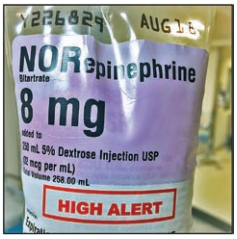

55 Norepinephrine Infusion for Preventing Postspinal Anesthesia Hypotension during Cesarean Delivery: A Randomized Dose-finding Trial

The most commonly used vasopressors for prevention of postspinal hypotension during cesarean delivery are ephedrine and phenylephrine. The α-adrenergic agonistic activity and weak β-adrenergic agonistic activity of norepinephrine make it a vasopressor with minimal cardiac depressant effect and an attractive alternative to phenylephrine and ephedrine in obstetric anesthesia. Three norepinephrine infusion rates (0.025, 0.050, 0.075 μg · kg^{-1} · min^{-1}) after an initial bolus of 5 μg for prophylaxis against postspinal hypotension during cesarean delivery were compared in a randomized, controlled, double-blinded trial of 284 patients. The frequency of postspinal hypotension, defined as a 20% decrease in systolic blood pressure from the baseline reading, was similar in both the 0.050 μg · kg^{-1} · min^{-1}-dose group (24.7%), and the 0.075 μg · kg^{-1} · min^{-1}-dose group (26.0%) and both were less than that in the 0.025 μg · kg^{-1} · min^{-1}-dose group (42.1%) (odds ratios 0.45 [95% CI, 0.24 to 0.82] and 0.48 [95% CI, 0.26 to 0.89], respectively).

(Summary: M. J. Avram. Image: J. P. Rathmell.)

119 Positive End-expiratory Pressure and Mechanical Power

Because expenditure of energy is required to inflict damage, mechanical power (the intensity of energy delivery to the respiratory system) has been proposed as a unifying concept that includes all primary ventilator settings shown experimentally to influence ventilator-induced lung injury. The effects of increasing mechanical power by selectively modifying its positive end-expiratory pressure (PEEP) component was studied in 36 healthy piglets ventilated prone for 50 h at 30 breaths/min, with a tidal volume equal to functional residual capacity, and randomly allocated to one of six PEEP groups (0, 4, 7, 11, 14, and 18 cm H_2O). The total mechanical power applied to the lungs was similar at PEEP levels of 0, 4, and 7 cm H_2O, because the increase due to rising PEEP was offset by the simultaneous decreases in driving pressure and the resistive components. In contrast, mechanical power increased proportionally to the applied PEEPs of 11, 14, and 18 cm H_2O, while the dynamic and resistive components of power remained unchanged. *See the accompanying Editorial View on page 9.*

(Summary: M. J. Avram. Image: J. P. Rathmell.)

12 Practice Advisory for Perioperative Visual Loss Associated with Spine Surgery 2019: An Updated Report by the American Society of Anesthesiologists Task Force on Perioperative Visual Loss, the North American Neuro-Ophthalmology Society, and the Society for Neuroscience in Anesthesiology and Critical Care

This Practice Advisory updates "Practice Advisory for Perioperative Visual Loss Associated with Spine Surgery: An Updated Report by the American Society of Anesthesiologists Task Force on Perioperative Visual Loss," adopted by the American Society of Anesthesiologists in 2011 and published in 2012. This Advisory focuses on the perioperative management of patients who are undergoing spine procedures while they are positioned prone and receiving general anesthesia. Advisory statements are provided on preoperative patient evaluation and preparation, intraoperative management, including blood pressure management, management of blood loss and administration of fluids, use of vasopressors, patient and head positioning devices, and staging of surgical procedures, as well as postoperative management.

(Summary: M. J. Avram. Image: J. P. Rathmell.)

154 Why Money Alone Can't (Always) "Nudge" Physicians: The Role of Behavioral Economics in the Design of Physician Incentives (Review Article)

The healthcare industry is increasingly seeking to motivate physicians to adopt desirable behaviors (defined as enhanced productivity and adherence to quality metrics) with financial incentives. Behavioral economics seeks to define how humans respond to incentives, how to maximize desired behavioral change, and how to avoid perverse negative effects on work effort. Applying behavioral economics principles to the construction of financial incentives enhances the probability of success and optimizes the impact. Clinician productivity is usually responsive to financial incentives of sufficient size. However, while financial incentives can increase performance on selected quality metrics, their effect on important outcomes like mortality are minimal and they can occasionally deliver a perverse effect. Therefore, financial incentives should be only one part of a change management strategy. Fixing systems that support faultless delivery of care and appealing to the powerful forces that have guided physicians' altruism and self-image as a healer might be more effective ways to improve quality of care.

(Summary: M. J. Avram. Image: J. P. Rathmell.)