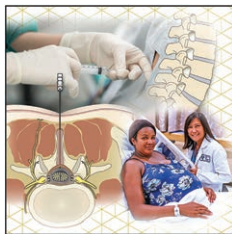


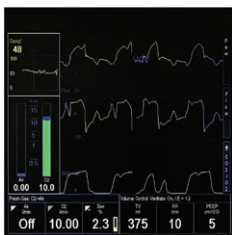
THIS MONTH IN ANESTHESIOLOGY



840 Education Program Regarding Labor Epidurals Increases Utilization by Hispanic Medicaid Beneficiaries: A Randomized Controlled Trial

The use of epidural analgesia to manage labor pain is lower in Hispanic than Caucasian women in the United States. The hypothesis that a linguistically concordant educational program that describes the epidural procedure, clarifies benefits and risks, and explains alternative analgesic techniques may improve epidural analgesia use was tested in a randomized, controlled trial of two separate cohorts of women of Hispanic and non-Hispanic ethnicity. Within each cohort, patients with a singleton fetus who were free to choose epidural labor analgesia were equally randomized to receive either the study education or routine care, which included the opportunity to receive free prenatal education. Among the Hispanic cohort, patients assigned to the educational

intervention were more likely (40 of 50) to receive epidural analgesia compared to patients assigned to the routine care group (30 of 50; relative risk 1.33; 95% CI, 1.02 to 1.74). For the non-Hispanic cohort, there was no evidence of a difference in epidural use between the intervention (41 of 50) and routine care (42 of 49) groups (relative risk 0.96; 95% CI, 0.80 to 1.14). (Summary: M. J. Avram. Image: S. Jarret, C.M.I. and J. P. Rathmell.)



809 Positive End-expiratory Pressure and Postoperative Atelectasis: A Randomized Controlled Trial

Although general anesthesia commonly induces pulmonary atelectasis, early applied moderate positive end-expiratory pressure prevents or reverses it for healthy patients undergoing nonabdominal surgery. The hypothesis that withdrawing positive end-expiratory pressure just before emergence preoxygenation would attenuate postoperative atelectasis formation was tested in a randomized, controlled trial of 30 patients undergoing elective hernia repair or orthopedic extremity surgery. After surgery and ventilation with positive end-expiratory pressure, the median atelectasis area before awakening (baseline) for the positive and the zero end-expiratory pressure during awakening groups combined was 3.3 cm² (95% CI, 2.5 to 3.9 cm²), corresponding to 1.3% (95% CI, 1.1 to 1.6%) of total lung area. Atelectasis increased in both groups during awakening, but the change from before awakening to after extubation did not differ between groups; the median (range) change in atelectasis for the positive end-expiratory pressure group was 1.6 cm² (-1.1 to 12.3 cm²) and that for the zero end-expiratory pressure group was 2.3 cm² (-1.6 to 7.8 cm²), for a difference of 0.7 cm² (95% CI, -0.8 to 2.9 cm²). See the accompanying Editorial View on

page 771. (Summary: M. J. Avram. Image: J. P. Rathmell.)



801 Assessment of Common Criteria for Awake Extubation in Infants and Young Children

The clinician's ability to correctly judge the optimal time to extubate a pediatric patient awake after inhalational anesthesia is essential, but extubation criteria used in routine settings can vary significantly. A prospective, observational study was conducted in 600 children 0 to 7 yr of age to evaluate the predictive value of various extubation criteria to determine which factors individually or collectively are most important in the awake extubation of young patients emerging from inhalational anesthesia. The rate of successful extubation was 92.7%. Five predictors were associated with extubation success: facial grimace, odds ratio 1.93 (95% CI, 1.03 to 3.60); purposeful movement, odds ratio 2.42 (95% CI, 1.14 to 5.12); conjugate gaze, odds ratio 2.10 (95% CI, 1.14 to

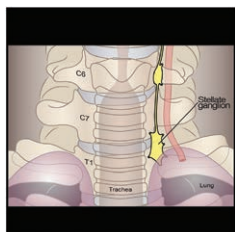
4.01); eye opening, odds ratio 4.44 (95% CI, 1.06 to 18.64); and tidal volume more than 5 ml/kg, odds ratio 2.66 (95% CI, 1.21 to 5.86). A stepwise increase in any one of these predictors being present in any order, from 1 of 5 to 5 of 5, yielded positive predictive values for successful extubation that increased from 88.3 to 100.0%. See the accompanying Editorial View on page 769. (Summary: M. J. Avram. Image: S. Suresh.)



830 Hypoxemia, Bradycardia, and Multiple Laryngoscopy Attempts during Anesthetic Induction in Infants: A Single-center, Retrospective Study

Multiple laryngoscopy attempts in infants may be required for various reasons, including inexperience with the procedure and limited intubation time because of apnea intolerance. The hypothesis that normal infants requiring multiple laryngoscopy attempts for tracheal intubation would be more likely to experience hypoxemia or bradycardia during induction of anesthesia was tested in a retrospective study of 1,341 infants 12 months of age or younger who received general anesthesia and underwent elective tracheal intubation via direct laryngoscopy. Two hundred and eight (16%) infants required two or more laryngoscopy attempts to achieve tracheal intubation. Hypoxemia occurred in 469 (35%) infants while 119 (9%) experienced bradycardia. Hypoxemia and

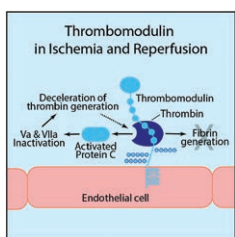
bradycardia occurred in 50 (3.7%) of them but were not observed simultaneously. After controlling for confounding in the multivariable model, infants requiring multiple laryngoscopy attempts had a 78% higher risk of hypoxemia (adjusted odds ratio 1.78; 95% CI, 1.30 to 2.43). Multiple attempts were not associated with bradycardia (adjusted odds ratio 1.23; 95% CI, 0.75 to 2.03). (Summary: M. J. Avram. Image: The Noun Project.)



883 Outcomes of Sympathetic Blocks in the Management of Complex Regional Pain Syndrome: A Retrospective Cohort Study

Sympathetic blocks have been a well-accepted component of clinical management for patients with complex regional pain syndrome. The hypotheses that sympathetic blocks provide analgesic effects that may be predicted by the temperature differences between the two extremities before and after the blocks in patients with complex regional pain syndrome and that the responses to sympathetic blocks may predict the success of spinal cord stimulation trials in these patients were tested in a retrospective observational study of 255 patients. The estimated odds ratio of having successful pain reduction was 1.05 (97.5% CI, 0.93 to 1.19) for a one-degree decrease in the difference between involved and contralateral extremity, after

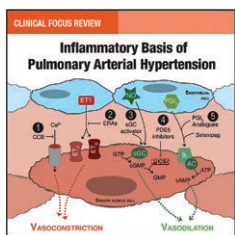
adjusting for potential confounding factors. Sixty-nine patients with complex regional pain syndrome underwent spinal cord stimulation trials. Successful trials were achieved in 35 of 40 patients (87.5%) with more than 50% pain reduction after sympathetic blocks and in 26 of 29 patients (89.7%) with less than 50% pain reduction after sympathetic blocks. (Summary: M. J. Avram. Image: G. Nelson.)



866 Recombinant Thrombomodulin on Neutrophil Extracellular Traps in Murine Intestinal Ischemia–Reperfusion

Hypotheses tested in male mice were that histones and neutrophil extracellular trap formations would contribute to development of remote organ damage induced by intestinal ischemia–reperfusion and that recombinant thrombomodulin would attenuate multiple organ dysfunction progression by blocking histones and neutrophil extracellular trap formations, leading to improved survival after intestinal ischemia–reperfusion. Thrombomodulin is a transmembrane glycoprotein expressed on the surfaces of various cells that forms a complex with thrombin *via* its epithelial growth factor-like domain to activate protein C and inhibit thrombin activity. Thrombomodulin also exerts anti-inflammatory effects. Treatment with 10 mg/kg recombinant thrombomodulin (but not with 5 mg/kg)

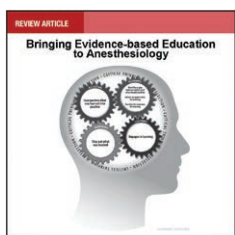
improved survival in mice with severe (45-min) intestinal ischemia–reperfusion injury (ischemia–reperfusion vs. ischemia–reperfusion plus 10 mg/kg recombinant thrombomodulin, 0% vs. 33%, n = 21 per group). No incremental improvement was observed with 20 mg/kg recombinant thrombomodulin. Recombinant thrombomodulin attenuated liver injury by abrogating the increases in histone accumulation and neutrophil extracellular trap formation, which may have led to improved survival in intestinal ischemia–reperfusion–injured mice. (Summary: M. J. Avram. Image: J. P. Rathmell.)



898 Inflammatory Basis of Pulmonary Arterial Hypertension: Implications for Perioperative and Critical Care Medicine (Clinical Focus Review)

Pulmonary arterial hypertension is a disease in which progressive pulmonary vascular obstruction, remodeling, and destruction lead to increased right ventricular afterload and hypertrophy, right heart failure, and death. It is an indolent, progressive disease for which current therapeutics work by dilating the pulmonary vasculature, thereby offsetting the elevated right ventricular afterload. Pulmonary vasodilator drugs target one of four major pathways involving L-type calcium channels, endothelin-1, nitric oxide, and prostacyclin. Patients with pulmonary arterial hypertension have a considerable risk of perioperative morbidity and mortality and great care and planning must go into their surgical care. Throughout this review, the implications of pulmonary arterial hypertension for perioperative and critical care specialists are emphasized,

beginning with a discussion of the perioperative management of patients with pulmonary arterial hypertension. The immunologic basis of pulmonary arterial hypertension is reviewed, highlighting biomedical and clinical evidence, as are ongoing clinical trials targeting the immune system, potential immunomodulatory therapeutic strategies for future study, and implications of the evolving understanding of the pathobiology of pulmonary arterial hypertension. (Summary: M. J. Avram. Image: From original article.)



908 Learners and Luddites in the Twenty-first Century: Bringing Evidence-based Education to Anesthesiology (Review Article)

This review describes the best available evidence in education for teaching knowledge, procedural skills, and professionalism. Implementation of evidence from cognitive science and healthcare education research offers the promise of improving knowledge acquisition and retention. Active learning is learner-centered education in which learners apply knowledge and solve problems. Spaced learning, interleaving, and retrieval practice may help improve knowledge retention. Cognitive aids are being used to help prevent noncompliance due to knowledge and memory errors. E-learning provides platforms to enable flexible use of these knowledge acquisition, retention, and assistance techniques on a daily basis. Teaching procedural skills in anesthesiology is challenging due to the

complex interplay of knowledge, manual dexterity, and workflow elements, all of which need to be learned and applied in concert. In addition, teaching and assessing clinical performance and professionalism through role modeling and role play is becoming a more recognized need. Finally, experiential learning through simulation and objective structured clinical examinations is becoming more prominent in both education and summative assessment. (Summary: M. J. Avram. Image: Adapted with permission from Cutrer WB, et al. *Acad Med* 2017; 92:70–5.)