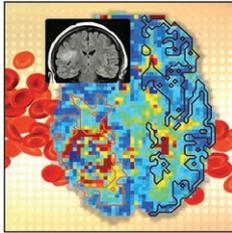


THIS MONTH IN ANESTHESIOLOGY



788 Cerebral Macro- and Microcirculation during Ephedrine versus Phenylephrine Treatment in Anesthetized Brain Tumor Patients: A Randomized Clinical Trial Using Magnetic Resonance Imaging

Brain oxygenation depends on the macroscopic blood supply, quantified by cerebral blood flow, and the microscopic blood distribution across brain capillaries, quantified by capillary transit time heterogeneity. Phenylephrine and ephedrine are administered to treat anesthesia-related hypotension and maintain cerebral perfusion pressure during neurosurgical procedures. The hypotheses tested in this randomized clinical trial were that capillary transit time heterogeneity in selected brain regions is greater during infusion of phenylephrine than of ephedrine and that this increase may cause tissue oxygen tension to decrease. Dynamic susceptibility contrast magnetic resonance imaging of peritumoral and contralateral hemispheres was used to determine the effects of phenylephrine and ephedrine on cerebral macro- and microcirculation in 20 anesthetized brain tumor patients. Capillary transit time heterogeneity in the contralateral brain region was increased by phenylephrine and decreased by ephedrine, despite reaching similar mean arterial pressure endpoints. A similar pattern was observed in the peritumoral region, without reaching statistical significance. Cerebral blood flow and indices of tissue oxygenation in both regions increased more in patients treated with ephedrine than with phenylephrine. See the accompanying Editorial on [page 775](#). (Summary: M. J. Avram. Image: A. Johnson, Vivo Visuals Studio.)

Brain oxygenation depends on the macroscopic blood supply, quantified by cerebral blood flow, and the microscopic blood distribution across brain capillaries, quantified by capillary transit time heterogeneity. Phenylephrine and ephedrine are administered to treat anesthesia-related hypotension and maintain cerebral perfusion pressure during neurosurgical procedures. The hypotheses tested in this randomized clinical trial were that capillary transit time heterogeneity in selected brain regions is greater during infusion of phenylephrine than of ephedrine and that this increase may cause tissue oxygen tension to decrease. Dynamic susceptibility contrast magnetic resonance imaging of peritumoral and contralateral hemispheres was used to determine the effects of phenylephrine and ephedrine on cerebral macro- and microcirculation in 20 anesthetized brain tumor patients. Capillary transit time heterogeneity in the contralateral brain region was increased by phenylephrine and decreased by ephedrine, despite reaching similar mean arterial pressure endpoints. A similar pattern was observed in the peritumoral region, without reaching statistical significance. Cerebral blood flow and indices of tissue oxygenation in both regions increased more in patients treated with ephedrine than with phenylephrine. See the accompanying Editorial on [page 775](#). (Summary: M. J. Avram. Image: A. Johnson, Vivo Visuals Studio.)



804 December Is Coming: A Time Trend Analysis of Monthly Variation in Adult Elective Anesthesia Caseload across Florida and Texas Locations of a Large Multistate Practice

Commercially insured patients in high-deductible plans may be incentivized to schedule elective surgical procedures at the end of the calendar year in years when their deductible has been met. The hypothesis that daily elective anesthesia caseload would be higher in December than in other months and would vary with age and insurance status was tested in a retrospective review of aggregated adult case volume data from Florida and Texas locations of a large multipractice private anesthesia group from 2017 to 2019. The final analyses included 3,504,394 cases. After adjustment for time trends, practice location and type, daily caseloads

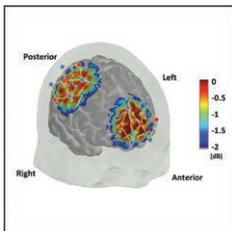
in December 2017 increased 20% from 4,196 cases during the January to November period to 5,039 cases in December. The magnitude of this increase was similar in 2018 and 2019. The proportion of commercially insured patients increased from 0.45 during January to November 2017 to 0.58 in December, and the proportion of patients ages 18 to 65 increased from 0.56 in January to November to 0.65 in December, with similar increases in 2018 and 2019. See the accompanying Editorial on [page 778](#). (Summary: M. J. Avram. Image: J. P. Rathmell.)



829 Persistent Postoperative Opioid Prescription Fulfillment and Peripheral Nerve Blocks for Ambulatory Shoulder Surgery: A Retrospective Cohort Study

Surgery has been associated with an increased risk of persistent postoperative opioid use. Peripheral nerve blocks can reduce early postoperative pain to a clinically important extent. The hypothesis that the receipt of a peripheral nerve block would be associated with a lower incidence of persistent postoperative opioid prescription fulfillment was tested in a retrospective, population-based cohort study of patients undergoing ambulatory shoulder surgery. Of the 48,523 patients who underwent shoulder surgery, 30,377 (63%) received a peripheral nerve block, and 18,146 (37%) did not. Persistent postoperative opioid prescription fulfillment was recorded for 5,008 (16%) of those who received a peripheral nerve block and 3,221 (18%) of those who did not;

the adjusted odds ratio (95% CI) was 0.90 (0.83 to 0.97). The clinical significance of the association between receipt of a peripheral nerve block and a lower incidence of persistent postoperative opioid prescription fulfillment is unknown given the retrospective nature of this study and the failure of the sensitivity and secondary analyses to support a consistent relationship. (Summary: M. J. Avram. Image: Adobe Stock.)



877 Rhythmic Change of Cortical Hemodynamic Signals Associated with Ongoing Nociception in Awake and Anesthetized Individuals

Functional near-infrared spectroscopy measures cortical hemodynamic changes and has been used to detect amplitude and power changes in low-frequency oscillations. This study tested two hypotheses in evaluating ongoing pain/nociception with functional near-infrared spectroscopy in conscious volunteers and ongoing nociceptive inputs in unconscious anesthetized patients. The first was that ongoing nociception will induce similar reductions in the power of frontopolar cortex (a cortical region that is involved in high-level integration of nociceptive information) low-frequency hemodynamic oscillations. The second was that addition of a regional anesthetic blockade will mitigate the low-frequency power reductions in surgical patients. In 15 awake/conscious individuals, ongoing noxious heat produced reductions in the fractional power of slow-5 frequency band (0.010 to 0.027 Hz) oscillations over the frontopolar cortex compared to prestimulation resting state or ongoing innocuous heat. Similar spectral changes were observed for ongoing nociceptive inputs associated with an invasive surgical procedure in 13 anesthetized/unconscious patients undergoing knee surgery; a regional nerve block attenuated the slow-5 fractional power decrease in the frontopolar cortex. (Summary: M. J. Avram. Image: From original article.)

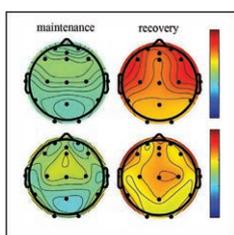
Functional near-infrared spectroscopy measures cortical hemodynamic changes and has been used to detect amplitude and power changes in low-frequency oscillations. This study tested two hypotheses in evaluating ongoing pain/nociception with functional near-infrared spectroscopy in conscious volunteers and ongoing nociceptive inputs in unconscious anesthetized patients. The first was that ongoing nociception will induce similar reductions in the power of frontopolar cortex (a cortical region that is involved in high-level integration of nociceptive information) low-frequency hemodynamic oscillations. The second was that addition of a regional anesthetic blockade will mitigate the low-frequency power reductions in surgical patients. In 15 awake/conscious individuals, ongoing noxious heat produced reductions in the fractional power of slow-5 frequency band (0.010 to 0.027 Hz) oscillations over the frontopolar cortex compared to prestimulation resting state or ongoing innocuous heat. Similar spectral changes were observed for ongoing nociceptive inputs associated with an invasive surgical procedure in 13 anesthetized/unconscious patients undergoing knee surgery; a regional nerve block attenuated the slow-5 fractional power decrease in the frontopolar cortex. (Summary: M. J. Avram. Image: From original article.)



842 Hypoxemia in Young Children Undergoing One-lung Ventilation: A Retrospective Cohort Study

Current approaches to one-lung ventilation in children undergoing noncardiac surgery involve endobronchial intubation or use of a bronchial blocker. The hypothesis that endobronchial intubation is associated with a higher risk of hypoxemia in children undergoing surgery and one-lung ventilation was tested in a retrospective observational study of 306 patients 2 months to 3 yr old undergoing noncardiovascular thoracic surgery with one-lung ventilation. A bronchial blocker was used in 35% (107 of 306) of the cases, and 49% (149 of 306) of the cases were left sided. The prevalence of hypoxemia, defined as a continuous oxygen desaturation less than 90% for at least 3 min during the period of one-lung ventilation, was 26% (81 of 306; 95% CI, 21 to 31%).

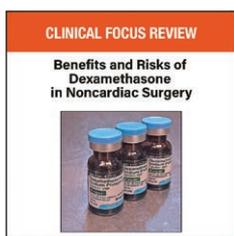
Factors associated with lower risk of hypoxemia in multivariable analysis included left operative side (odds ratio, 0.45; 95% CI, 0.25 to 0.78) and bronchial blocker use (odds ratio, 0.35; 95% CI, 0.18 to 0.67). (Summary: M. J. Avram. Image: J. P. Rathmell.)



813 Neurophysiologic Complexity in Children Increases with Developmental Age and Is Reduced by General Anesthesia

It is difficult to identify age-invariant markers of anesthetic-induced unconsciousness for pediatric patients because their brains undergo structural and functional changes during development, resulting in substantial brain network formation and refinement. A candidate strategy for perioperative brain monitoring in the pediatric population is the measure of neurophysiologic complexity in the cortex (cortical complexity), which can be broadly thought of as representing the differentiation or diversity of neural activity and can be analyzed using mathematical algorithms such as the Lempel-Ziv algorithm. The hypothesis that cortical complexity would increase with developmental age and decrease during general anesthesia was tested in a prospective cross-sectional study of 50

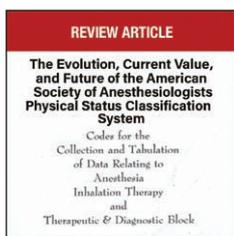
children 8 to 16 yr old undergoing general anesthesia. Age was positively correlated with cortical complexity during baseline recordings, and this was attributable to changes in the spectra of normalized electroencephalogram power. During anesthetic state transitions, cortical complexity decreased during the maintenance phase of general anesthesia compared to the eyes-closed baseline. Normalized spatiotemporal complexity remained reduced compared to baseline after recovery of consciousness. (Summary: M. J. Avram. Image: From original article.)



895 Benefits and Risks of Dexamethasone in Noncardiac Surgery (Clinical Focus Review)

Dexamethasone is commonly used in anesthesia and surgery as an antiemetic and to improve patient quality of recovery. The present Clinical Focus Review provides an updated summary of available evidence on the optimal perioperative dose of dexamethasone in adult noncardiac surgery patients, as well as its benefits and adverse effects and their clinical implications. Although both 4-mg and 8-mg doses of dexamethasone administered intravenously have consistently been shown to provide effective prophylaxis and treatment for postoperative nausea and vomiting, the 8-mg dose provides an antiemetic benefit for up to 72 h. The 8-mg dose also provides some analgesic benefit in some types of surgeries and almost certainly provides additional benefits

for quality of recovery and perhaps earlier hospital discharge. While dexamethasone increases blood glucose, the clinical significance of this is likely to be very small. Meta-analyses and a recent large trial have found that perioperative dexamethasone did not increase risk of surgical site infection. (Summary: M. J. Avram. Image: J. P. Rathmell.)



904 The Evolution, Current Value, and Future of the American Society of Anesthesiologists Physical Status Classification System (Review Article)

The American Society of Anesthesiologists (ASA) Physical Status classification system was developed in response to the need for a simple tool to collect and tabulate statistical data related to patients' status before anesthesia identified by the leaders of the society 80 yr ago. It has been used to stratify and compare patients before surgery based on the severity of their coexisting diseases and functional status since then. A major strength of the ASA Physical Status system is its simplicity, but its subjective 5-point scale cannot incorporate the myriad of factors that influence outcome in an individual. Therefore, the ASA Physical Status scale is limited in predicting risk as a stand-alone tool and it should never be used as a predictive tool for individual patients. Despite the

usefulness of the ASA Physical Status system, it has limitations. Examples of these are that there is little guidance on how to adjust for the many complications of pregnancy, the effect of intensive care unit interventions is undefined, and there is no way to integrate frailty into the ASA Physical Status. (Summary: M. J. Avram. Image: From original article.)