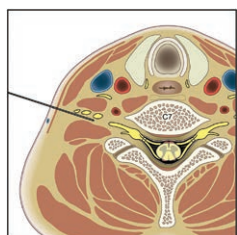




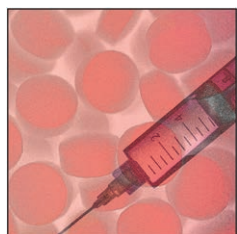
22 Differentiating Drug-related and State-related Effects of Dexmedetomidine and Propofol on the Electroencephalogram

Anesthetic drugs induce distinct neurophysiologic effects reflected in electroencephalogram patterns. The direct effects of dexmedetomidine and propofol and the effect of changing level of consciousness itself were studied in 47 young adult males randomized to receive one of the drugs using a rigorously standardized protocol. Both drugs were administered using target-controlled infusions, aiming at stepwise escalating pseudo steady-state plasma concentrations and titrated carefully to similar behavioral endpoints. State-related electroencephalogram patterns were distinguished from drug- or concentration-dependent phenomena by assessing changes induced by abrupt awakening during pseudo steady-state infusion. Electroencephalogram effects of dexmedetomidine and propofol were clearly different but there were also common state-related patterns. Among different spectral estimates, changes in slow-wave and alpha, but not beta, activity seemed to best detect different states of consciousness, although the interindividual variability was large. The changes induced by the two drugs clearly reverted when the subjects were awakened during the pseudo steady-state drug infusion. (Summary: M. J. Avram. Illustration: S. Jarret, C.M.I.)



47 Comparison of Anterior Suprascapular, Supraclavicular, and Interscalene Nerve Block Approaches for Major Outpatient Arthroscopic Shoulder Surgery: A Randomized, Double-blind, Noninferiority Trial

The interscalene nerve block for postoperative analgesia in patients undergoing shoulder surgery is associated with diaphragmatic paresis from phrenic nerve block. Diaphragmatic paresis may be avoided by performing brachial plexus blocks more distally. The hypothesis that the supraclavicular block or anterior suprascapular block would provide noninferior analgesia compared to the interscalene nerve block while producing less pulmonary dysfunction was tested in a randomized controlled trial of 189 patients undergoing unilateral shoulder surgery for rotator cuff or Bankart repair. The predetermined noninferiority limit was 1 on the 11-point numeric rating scale pain scores 60 min after completion of surgery. The difference in mean pain scores between the supraclavicular block group and the interscalene nerve block group was 0.4 (95% CI, -0.4 to 1.2), while that for the anterior suprascapular block group and the interscalene nerve block group was 0.1 (95% CI, -0.7 to 0.9). Respiratory function after the anterior suprascapular block was clinically and statistically superior to that after the interscalene nerve block. (Summary: M. J. Avram. Illustration: Adapted with permission from Neal JM, Rathmell JP: *Complications in Regional Anesthesia and Pain Medicine*, 2nd edition, Philadelphia, Lippincott Williams & Wilkins, 2013.)



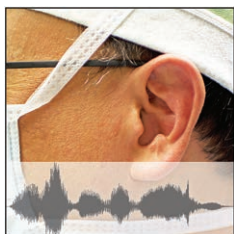
77 Impact of Intravenous Acetaminophen on Perioperative Opioid Utilization and Outcomes in Open Colectomies: A Claims Database Analysis

A multimodal approach to postoperative pain control consists of the simultaneous administration of two or more analgesics with different mechanisms of action, with the intent of reducing opioid use and opioid-related adverse effects. The hypothesis was that intravenous acetaminophen use, in isolation and in comparison to oral acetaminophen, would be associated with decreased opioid use (clinically significant reduction defined as 25%) and opioid-related adverse effects using data on 181,640 open colectomy patients from a large, national claims database. One quarter of the patients received intravenous acetaminophen, of whom nearly half received one dose on the day of surgery. Day of surgery use of more than one dose of oral acetaminophen (8.7% decrease in opioid use) was clinically and statistically indistinguishable from intravenous acetaminophen (8.0% decrease). Oral acetaminophen was associated with a 22.6% decrease in opioid use by those administered more than one dose on postoperative day 1, while intravenous acetaminophen produced a 12.4% decrease. (Summary: M. J. Avram. Image: J. P. Rathmell.)



89 Neuropsychological and Behavioral Outcomes after Exposure of Young Children to Procedures Requiring General Anesthesia: The Mayo Anesthesia Safety in Kids (MASK) Study

The Mayo Anesthesia Safety in Kids (MASK) study tested the hypothesis that exposure to multiple, but not to one, procedures requiring general anesthesia before a child's third birthday is associated with adverse neurodevelopmental outcomes. Using a matched cohort design, this hypothesis was evaluated by prospective neuropsychological testing of a propensity-guided sample of 997 children born in Olmsted County, Minnesota, between 1994 and 2007. The primary outcome for analysis was the full-scale intelligence quotient score of the Wechsler Abbreviated Scale of Intelligence. The median cumulative duration of anesthesia was 45 and 187 min in the single- and multiply-exposed children tested, respectively, and 42% of the procedures were otorhinolaryngologic. The intelligence quotient did not differ significantly according to exposure status, with multiply-exposed children scoring 1.3 points (95% CI, -3.8 to 1.2) lower and singly-exposed children scoring 0.5 points (95% CI, -2.8 to 1.9) lower than unexposed children. (Summary: M. J. Avram. Image: S. Suresh, Lurie Children's Hospital of Chicago.)



58 Auditory Icon Alarms Are More Accurately and Quickly Identified than Current Standard Melodic Alarms in a Simulated Clinical Setting

Audible alarms play a vital role in patient safety by alerting caregivers of patient or medical equipment state changes. Standard audible alarms are difficult to learn and distinguish from one another. Icon alarms are commonplace and acoustically complex sounds that mimic the underlying meanings they are meant to represent. The hypothesis that icon alarms are easier to learn and identify than standard alarms was tested in a simulated two-bed intensive care unit using 17 clinical anesthesia residents and three anesthesia attending physicians as subjects randomly assigned to standard or icon alarm groups. After a 5- to 10-min group-specific alarm orientation, anesthesia providers identified icon alarms more accurately and quickly than standard alarms. Overall accuracy rates for the icon alarms were

between 68% (power failure) and 100% (general alarm), while that for the standard alarms ranged from 15% (perfusion) to 75% (oxygenation). (Summary: M. J. Avram. Image: J. P. Rathmell.)



67 Current Ventilator and Oxygen Management during General Anesthesia: A Multicenter, Cross-sectional Observational Study

While supplemental oxygen administration during mechanical ventilation is important for preventing or correcting hypoxemia, liberally administered oxygen therapy could induce hyperoxemia. The hypothesis that potentially preventable hyperoxemia and substantial oxygen exposure would be common in routine ventilatory management during general anesthesia was tested in a convenience sample of 1,498 anesthetics drawn from a convenience sample of 43 hospitals in Japan in 2015. Potentially preventable hyperoxemia (defined as $SpO_2 > 98\%$ with a corresponding $FiO_2 > 0.21$) occurred in 1,236 patients (83%). Most received an FiO_2 of 0.31 to 0.6. A total of 483 patients (32%) were exposed to potentially substantial oxygen (defined as $FiO_2 > 0.5$ with a corresponding $SpO_2 > 92\%$) during general

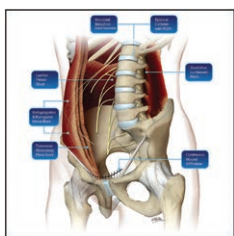
anesthesia. Old age, emergent surgery, and one-lung ventilation were independently associated with increased potentially substantial oxygen exposure, while use of volume control ventilation and positive end-expiratory pressure were associated with decreased oxygen exposure. (Summary: M. J. Avram. Image: J. P. Rathmell.)



163 Continuous Negative Abdominal Pressure Reduces Ventilator-induced Lung Injury in a Porcine Model

The lungs of patients with adult respiratory distress syndrome are often compartmentalized into two regions, aerated and atelectatic. Elevated airway pressure is used to recruit atelectasis but has failed to improve outcome in clinical trials. The hypothesis that addition of continuous negative abdominal pressure in injurious mechanical ventilation would reduce ventilator-associated lung injury was tested in 10 pigs with lung injury induced by surfactant lavage followed by 1 h of injurious ventilation. Pigs were randomly assigned to positive end-expiratory pressure alone or with continuous negative abdominal pressure. A low level of continuous negative abdominal pressure (-5 cm H_2O) protected against ventilator-induced lung injury (i.e., improved oxygenation and compliance as well as reduced pulmonary

edema and inflammatory cytokine expression in bronchoalveolar fluid), despite the same tidal volume and expiratory transpulmonary pressure. The mechanism of protection appeared to be selective recruitment of dorsal atelectatic lung and a corresponding increase in the volume of ventilated lung. (Summary: M. J. Avram. Image: J. P. Rathmell.)



192 A Review of the Impact of Obstetric Anesthesia on Maternal and Neonatal Outcomes (Review Article)

Studies in obstetric anesthesiology began with the use of volatile agents for labor anesthesia, shifted to opioids and amnestics, and then to neuraxial techniques and the effects of these interventions on labor and the newborn. The present review focuses on recent advances in obstetric anesthesia and identifies areas in which more progress is needed. Enhancements in neuraxial labor analgesic techniques, postpartum neuraxial pain management modalities, and prevention of intraoperative hypotension during cesarean delivery have contributed to improvements in care. More progress is needed in acute postpartum pain and its effect on chronic pain, the influence of labor pain on perinatal depression, labor epidural-mediated fever, and the effect of labor analgesia on the duration of the second

stage of labor and instrumental vaginal delivery. Research on individual physiologic characteristics of pain, labor progress, and other aspects of obstetric care will enhance clinicians' ability to personalize obstetric anesthesia therapies and interventions. (Summary: M. J. Avram. Illustration: From original article.)