

423 Posterior Tibial Artery as an Alternative to the Radial Artery for Arterial Cannulation Site in Small Children: A Randomized Controlled Study

Arterial size and depth from the skin are important determinants of successful arterial cannulation, which can be challenging in pediatric patients. The suitability of the posterior tibial artery with respect to diameter, depth from the skin surface, and cross-sectional area was determined using ultrasound in 60 children with a median age of 6 months and compared with that of the radial artery and the dorsalis pedis artery. A subsequent randomized controlled study compared the first-attempt success rate of ultrasound-guided arterial cannulation among the three arteries in 234 small children. The anatomic characteristics and suitability as a cannulation site of the posterior tibial and radial arteries were comparable and better than those of the dorsalis pedis. The first-attempt cannulation success rates for the posterior tibial (75%) and radial (83%) arteries were similar, and higher than that of the dorsalis pedis artery (45%). See the accompanying Editorial View on [page 408](#). (Summary: M. J. Avram. Illustration: S. Jarret, C.M.I. Photos: J. P. Rathmell. Ultrasound images from original article.)

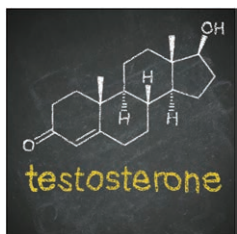
events may not exactly reflect actual care, the results of this study indicate that simulation can play a key role as one important component of clinician assessment. See the accompanying Editorial View on [page 410](#). (Summary: M. J. Avram. Image: Brigham and Women's Hospital, STRATUS Center for Medical Simulation.)



475 Simulation-based Assessment of the Management of Critical Events by Board-certified Anesthesiologists

The ability of an individual clinician involves a myriad of skills that cannot be captured by any single method of assessment. This study sought to evaluate simulation-based assessment and to quantify the distribution of technical and behavioral performance of board-certified anesthesiologists managing realistic perioperative simulated crises. Four moderate-length scenarios were designed that had multiple credible diagnoses and treatments, thus replicating typical challenges of real events. A total of 263 participants worked in a team with trained "confederate" clinicians and with a second board-certified anesthesiologist in the latter half of each scenario. Ten subject matter experts established the critical performance elements for each scenario and seven raters were trained based on these criteria. While performance during simulated crisis

events may not exactly reflect actual care, the results of this study indicate that simulation can play a key role as one important component of clinician assessment. See the accompanying Editorial View on [page 410](#). (Summary: M. J. Avram. Image: Brigham and Women's Hospital, STRATUS Center for Medical Simulation.)



457 Association of Testosterone Replacement Therapy and the Incidence of a Composite of Postoperative In-hospital Mortality and Cardiovascular Events in Men undergoing Noncardiac Surgery

There may be an increased risk of myocardial infarction, strokes, and thrombotic complications associated with prescription testosterone use. The present retrospective single-center cohort trial sought to identify the effect of testosterone replacement therapy on the incidence of a composite of postoperative in-hospital mortality and cardiovascular events in men undergoing noncardiac surgery between 2005 and 2015. To minimize any potential confounding, 947 men on testosterone replacement therapy were exactly matched with 4,598 men not taking testosterone on type of surgery and were well balanced on other covariates as a result of propensity-score matching. Among the matched patients, patients

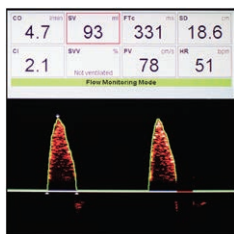
taking testosterone before surgery were not significantly different from those not taking testosterone on the composite of postoperative in-hospital mortality and cardiovascular events, including myocardial infarction, stroke, pulmonary embolism, and deep venous thrombosis. (Summary: M. J. Avram. Image: J. P. Rathmell.)



466 Accuracy of Capillary and Arterial Whole Blood Glucose Measurements Using a Glucose Meter in Patients under General Anesthesia in the Operating Room

Laboratory blood glucose concentration measurement is more time consuming and expensive than glucose meter testing and may not provide timely results for dosing insulin or treating hyperglycemia or hypoglycemia in the operating room. The hypothesis that capillary and arterial whole blood samples analyzed on a new glucose meter would meet established accuracy criteria for safe and effective insulin dosing was tested in 368 paired samples obtained intraoperatively from 196 patients. Compared with arterial glucose concentrations measured by a laboratory blood gas analyzer, the median bias for arterial whole blood glucose meter samples collected intraoperatively was -5 mg/dl, which

did not differ from the median bias of -4 mg/dl for capillary glucose meter samples. Both capillary and arterial blood glucose meter concentration measurements met accuracy criteria for subcutaneous insulin dosing but neither met criteria for more intensive glycemic control protocols. (Summary: M. J. Avram. Image: ©ThinkStock.)



450 Mini-fluid Challenge of 100 ml of Crystalloid Predicts Fluid Responsiveness in the Operating Room

Rational fluid administration is the cornerstone of perioperative hemodynamic optimization. The hypothesis that changes in stroke volume index induced by rapid infusion of a small volume of crystalloid could predict the effects of a larger volume of fluid was tested in 44 mechanically ventilated patients undergoing neurosurgery. Sets of measurements were performed before volume expansion, after infusion of 50 ml over 1 min, after infusion of another 50 ml over 1 min, and after infusion of the remaining 150 ml over 5 min. Positive fluid challenge was defined as a 10% or greater increase in stroke volume index from baseline after an infusion of 250 ml. Rapid administration of 100 ml of crystalloid predicted the effects of administering 250 ml of crystalloid with 93% sensitivity and 85% specificity. This strategy would

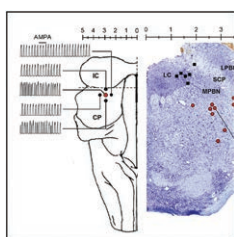
permit limiting fluid administration during negative fluid challenges. (Summary: M. J. Avram. Image: J. P. Rathmell.)



441 Reversal of Vecuronium-induced Neuromuscular Blockade with Low-dose Sugammadex at Train-of-four Count of Four: A Randomized Controlled Trial

Rocuronium-induced neuromuscular block can be reversed with sugammadex 0.5 mg/kg and 1.0 mg/kg when four twitches in response to train-of-four (TOF) stimulation have reappeared. While the affinity of sugammadex for rocuronium is 3.1 times that for vecuronium, the neuromuscular blocking potency of vecuronium is 6 times that of rocuronium. The hypothesis that low doses of sugammadex would adequately reverse a threshold TOF count of four vecuronium-induced neuromuscular blockade was tested in a randomized controlled trial of 64 patients. Sugammadex 0.5 mg/kg did not produce prompt and satisfactory neuromuscular recovery when administered at a threshold TOF count of four. Sugammadex 1.0 mg/kg adequately reversed this level of block, although recovery took twice as long as that reported after rocuronium. Recurrent neuromuscular block occurred after treatment of this level of block with sugammadex doses of 0.5 to 2.0 mg/kg. Low-dose sugammadex does not adequately reverse vecuronium-induced neuromuscular blockade. (Summary: M. J. Avram. Image: J. P. Rathmell.)

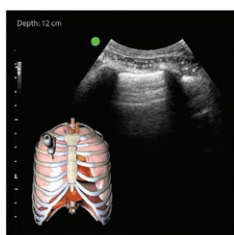
TOF count of four. Sugammadex 1.0 mg/kg adequately reversed this level of block, although recovery took twice as long as that reported after rocuronium. Recurrent neuromuscular block occurred after treatment of this level of block with sugammadex doses of 0.5 to 2.0 mg/kg. Low-dose sugammadex does not adequately reverse vecuronium-induced neuromuscular blockade. (Summary: M. J. Avram. Image: J. P. Rathmell.)



502 A Subregion of the Parabrachial Nucleus Partially Mediates Respiratory Rate Depression from Intravenous Remifentanyl in Young and Adult Rabbits

There are conflicting reports of the site in the brainstem at which clinically relevant opioid concentrations depress the respiratory rate. In an earlier study, an intravenous remifentanyl infusion affected inspiratory and expiratory phase timing in the preBötzinger complex of the decerebrate rabbit, but reversing these effects with local naloxone injections did not reverse the respiratory rate depression. A new study conducted in decerebrate young and adult rabbits sought to determine whether clinically relevant opioid concentrations alter the respiratory pattern through effects in the parabrachial nucleus and whether these effects are different from those in the preBötzinger complex. Respiratory rate depression produced by intravenously administered remifentanyl could be substantially reversed with localized

naloxone injection into a subregion of the parabrachial nucleus of the decerebrate rabbit, confirming the relevance of that area in opioid-induced respiratory depression. (Summary: M. J. Avram. Image: Modified from article.)



568 I-AIM (Indication, Acquisition, Interpretation, Medical Decision-making) Framework for Point of Care Lung Ultrasound (Clinical Concepts and Commentary)

There is a growing body of evidence supporting use of lung ultrasound as a diagnostic and monitoring tool. The present Clinical Concepts and Commentary presents a systematic approach to point of care lung ultrasound based on the I-AIM (indication, acquisition, interpretation, medical decision-making) framework. The diagnostic and monitoring indications for use of lung ultrasound are first reviewed. Patient, probe, picture, and protocol considerations related to image acquisition are then discussed followed by presentation of a logical stepwise approach to image interpretation. The Commentary concludes by emphasizing the fact that point of care lung ultrasound must be performed and

interpreted within a clinical context, defined by the history, physical examination, and other standard radiologic and laboratory testing. Three examples of application of the I-AIM framework to use of lung ultrasound as part of the clinical work-up of patients with dyspnea are provided. (Summary: M. J. Avram. Image: From original article/adapted from <http://pie.med.utoronto.ca/POCUS/>.)