PODCAST TRANSCRIPTION

Hs, this is Evan Kharasch, Editor-in-Chief of Anesthesiology, with some highlights from the February 2018 issue.

Our first clinical investigation evaluated an intraoperative decision support system. The extent to which intraoperative decision support systems guide care and improve outcomes remains unclear. We look first at an ambitious, multi-parameter intraoperative decision-support system with real-time visualizations. Dr. Sachin Kheterpal and colleagues at the University of Michigan Medical School hypothesized that such a decision-support system could improve both processes of care and clinical outcomes. The authors compared a novel decision support system to a historical control group and to a matched non-randomized contemporaneous control group. They sorted 27,000 patients with cases that occurred during a six-year period. Inclusion criteria were adults under general anesthesia, advanced medical diagnosis, case duration ≥ 60 minutes, and length of stay ≥ 2 days. The process measures were avoidance of intraoperative hypotension, ventilator tidal volume ≥ 10 mL/kg, and crystalloid administration (c/cg/hour). Kheterpal et al. found that decision support was associated with some but not all improved processes-of-care measures compared to contemporaneous control patients, but not with improved clinical outcomes. The authors concluded that all decision support systems should be formally evaluated because the extent to which they enhance patient care is not obvious. This podcast article is accompanied by two editorials, discussing validation and regulatory approval of decision support systems.

Our next clinical investigation continues on the theme of perioperative information. While anesthesia information management systems can provide useful data for patient care, research, and medicolegal purposes, they cannot verify if a particular value is true or an artifact. It may be impossible to differentiate retrospectively between actual errors in data collection and intercurrent events. Dr. Antoine J. Houvoet and colleagues at Wilhelmina Children’s Hospital, University Medical Center Utrecht, Netherlands, hypothesized that the difference in physiology and anesthetic technique between children and adults would result in a different incidence of artifacts and deviating values. They conducted a prospective observational cohort to investigate the incidence of artifacts in anesthesia information management system data in children undergoing surgical procedures. Secondary outcomes included the incidence of artifacts among deviating and non-deviating values, among the anesthesia phases, and among different anesthetic techniques. Among 136 pediatric surgeries at their institution during the study period, they found that the incidence of artifacts was low for heart rate and oxygen saturation, 0.5% and 1.3%, respectively. However, the rate was higher for noninvasive and invasive blood pressure and endtidal carbon dioxide, 7.5%, 5.0% and 7.3%. Deviating values were more often artifacts than values in a normal range, and artifacts were also associated with the phase of anesthesia and anesthetic technique. This research shows that not all values in anesthesia information management systems are valid. The authors suggest there is a need to develop automatic data validation solutions to deal with artifacts in data.

Our last original investigation evaluated perioperative risk. Traditionally, the intrinsic risk of postoperative cardiac adverse events has been attributed to broad categories of operations based upon either anatomical site or surgical service. Detailed procedure-specific risks, independent of underlying patient comorbidities, have not been robustly analyzed or reported. Dr. Jason B. Liu of the American College of Surgeons and colleagues there and elsewhere, sought to define the intrinsic cardiac risks of individual operations. They studied records from 3 million elective operations performed at hospitals participating in the American College of Surgeons’ National Surgical Quality Improvement Program during a six-year period. They sorted intrinsic risks into high-, intermediate-, and low-risk categories, and identified the most commonly performed operations from each category. Liu et al. also examined intrinsic operative risks using a representative grouping of operations to portray within-group variation. In all, the researchers identified 66 low-risk, 30 intermediate-risk, and 106 high-risk operations. Excessional breast biopsy had the lowest intrinsic cardiac risk with an overall rate of 0.01%, and aorto-bifemoral bypass grafting had the highest risk with an overall rate of 4.1%. Given the continuum of intrinsic cardiac risk that exists among operations, Liu et al. concluded that grouping operations into broad categories or does not adequately account for the intrinsic cardiac risk of individual operations. These data may advance our patient-specific risk/benefit analyses and help refine medical decision-making.

Our next article reports on cell salvage in obstetrics. We know that intraoperative cell salvage in obstetrics reduces the need for allogeneic blood transfusion and mitigates postpartum anemia after cesarean delivery. But cost-effectiveness analyses of cell salvage for every cesarean delivery; cell salvage use only for high-risk cases; and no cell salvage. Lim et al. found that cell salvage use for cases at high risk that exists among operations, Liu et al. concluded that grouping operations into broad categories or does not adequately account for the intrinsic cardiac risk of individual operations. These data may advance our patient-specific risk/benefit analyses and help refine medical decision-making.

Our last original investigation used a laboratory rat model to study shock. Although hemorrhagic shock can cause organ injury and organ failure, there is currently no treatment to protect or treat the microcirculation. Ms. Michelle Trieu of VU University Medical Center, Amsterdam, the Netherlands, and colleagues there and elsewhere in the Netherlands and Canada used a rodent model to investigate whether therapeutically targeting the endothelial angiotensin/Tie2 system preserves microvascular integrity during hemorrhagic shock. They treated rats with the angiotensin-1 mimetic vasculotide and subjected them to hemorrhagic shock and fluid resuscitation. The investigators assessed microcirculatory perfusion with intravital microscopy, and assessed leakage and Evans blue dye extravasation. They also studied the angiotensin/Tie2 system at the protein and RNA level in plasma, kidneys, and lungs. Trieu et al. found that hemorrhagic shock significantly reduced the capillary perfusion and increased leakage, and increased and increased Tie2 expression significantly, even though it significantly decreased Tie2 gene expression and induced microvascular leakage in kidneys and lungs. Vasculotide had no effect on hemodynamics and microcirculatory integrity during hemorrhagic shock, but restored microvascular perfusion following fluid resuscitation. Trieu et al. concluded that targeting Tie2 restored microvascular leakage and microcirculatory perfusion and reduced fluid resuscitation requirements in an experimental model of hemorrhagic shock. The Tie2 system may be a promising target in restoring microvascular integrity and may reduce organ failure during hemorrhagic shock.

In this month’s Clinical Concepts and Commentary article, Dr. Andreas Koster of Ruhr-University Bochum in Germany and colleagues at the University of Toronto and the University of Toronto School of Medicine used the observation that the use of heparin-induced thrombocytopenia or other antiplatelet agents or heparin in preoperative settings, the parenteral direct thrombin inhibitors argatroban and bivalirudin are currently the first line alternatives. However, the use of these agents requires additional understanding of their pharmacodynamics, dosing and monitoring, and their potential side effects. All available data indicate that both drugs can be used to achieve results comparable to fractionated heparin. But the lack of a reversal agent for argatroban and bivalirudin presents a significant challenge. However, patients on encapsulated membrane oxygenators are at increased risk for heparin-induced thrombocytopenia and so may warrant the preemptive use of direct thrombin inhibitors. Clinicians must consider that the delicate balance between sufficient anticoagulation and prevention of bleeding complications is hard to achieve in these patients due to changes in the coagulation system.

Finally, our review article this month looks at the role of neuromonitoring in the management of traumatic brain injury. Dr. Martin Smith of University College London Hospitals describes various neuromonitoring techniques that can be used to guide the management of patients with traumatic brain injury, and examines the latest evidence and expert consensus guidelines for neuromonitoring. Management of traumatic brain injury is based on the central concept that preventing secondary brain injury is associated with improved outcomes. Neuromonitoring can guide therapeutic interventions intended to prevent or minimize secondary injury. No single neuromonitor can identify comprehensively the spectrum of pathophysiologic changes after traumatic brain injury, so modularity monitoring—the measurement of several variables simultaneously—provides a more complete picture of the injured brain’s pathophysiology and its response to treatment. Assessment of cerebral hemodynamics, oxygenation, and metabolic status allow treatment decisions to be guided by monitored changes in physiological variables rather than by pre-defined, generic thresholds. The failure of recent high-profile therapeutic clinical trials has raised questions with respect to whether there should be a paradigm shift in traumatic brain injury research toward more individualized, data-driven therapeutic strategies that take advantage of the wealth of data supporting currently the first line alternatives. However, the use of these agents requires additional understanding of their pharmacodynamics, dosing and monitoring, and their potential side effects. All available data indicate that both drugs can be used to achieve results comparable to fractionated heparin. But the lack of a reversal agent for argatroban and bivalirudin presents a significant challenge. However, patients on encapsulated membrane oxygenators are at increased risk for heparin-induced thrombocytopenia and so may warrant the preemptive use of direct thrombin inhibitors. Clinicians must consider that the delicate balance between sufficient anticoagulation and prevention of bleeding complications is hard to achieve in these patients due to changes in the coagulation system.

More noteworthy articles await readers in the February issue of Anesthesiology. I’ll be back in just a few short weeks with an inside look at our March podcast, which will continue to hold dietary soda consumption. High dietary soda consumption is associated with increased blood pressure, but why? The adverse effects of soda are partly explained by expansion of extracellular volume and direct effects of sodium on the vessel wall. We look at the underlying evidence and its role in future decision-making.

Anesthesiology, V 128 • No 2 February 2018