



Hello, I'm Jim Rathmell, Editor-in-Chief of ANESTHESIOLOGY here with the March 2024 podcast. This month I'll describe several studies focusing on common surgical issues. One study explores whether general or spinal anesthesia is better for hip fracture surgery. Another study looks at the common problem of the handoff of surgical patients from one anesthesia clinician to another. Our Clinical Focus Review this month discusses the management and resuscitation of hemorrhagic shock. And this month's review article offers readers a better understanding of recovery from general anesthesia.

Let's start with a special article on the impact of basic and translational research on clinical practice. Written by Juan Cata and Dan Sessler, this article discusses clinical trials examining the association between regional anesthesia and cancer recurrence and the disconnect between these clinical trial findings and the basic science findings in cell and animal models. They discuss a major clinical trial studying the link between paravertebral anesthesia and breast cancer recurrence, which found no association. Yet, preclinical evidence had demonstrated that spinal anesthesia suppressed metastatic dissemination by inhibiting surgical stress and boosting the immunological response. This trial — along with others — found that regional anesthesia did not reduce cancer recurrence or improve survival after cancer surgery. Cata and Sessler review factors that might have contributed to the discordance and what can be learned from these findings. In an invited editorial, Jian Hu, a leading cancer biologist, remarks that many factors might contribute to a clinical trial failure. Dr. Hu also reflects on how even these negative trials can deepen our understanding of underlying disease mechanisms.

23-00652 and 23-01154

Next, let's look at spinal and general anesthesia and ask if one has better outcomes than the other? Both are commonly used for patients undergoing surgery on their lower extremities. Mark Neuman and fellow researchers theorized that spinal anesthesia would be associated with better long-term outcomes when compared with general anesthesia. They conducted an analysis of long-term outcomes, comparing patients who received spinal versus general anesthesia for hip fracture surgery. This was a planned secondary analysis of the Regional versus General Anesthesia for Promoting Independence after Hip Fracture or REGAIN trial. The primary outcomes at 60 days were similar and were published in the New England Journal of Medicine in November 2021. In this multicenter trial, 1600 patients over 50 years old were randomized to receive spinal or general anesthesia in a 1:1 ratio using permuted block randomization with variable block sizes. They found that spinal anesthesia versus general anesthesia had no impact on survival up to 1 year after surgery. There were also no differences in ambulation recovery, inability to walk, or new transition to a nursing home. In an accompanying editorial, Elizabeth Whitlock and Alexander Smith emphasized the value for anesthesiologists to know that any well-conducted anesthetic, general or spinal, can be safely used without compromising outcomes. They tell us what most of us are thinking after years of believing otherwise: just how remarkable it is that there is no difference in outcomes between general and spinal anesthesia. Listen to the featured author podcast for more details about the study's findings.

23-00563 and 23-01267

Another surgical study looks at a common problem we all face in transferring patient care from one anesthesia clinician to another. During this handover, we relay vital patient information, but critical details are often lost. Can this loss of information lead to adverse patient outcomes? Amit Saha and Scott Segal hypothesized that the use of a structured handover tool would help improve outcomes. Using retrospective outcome data, they identified adult patients undergoing non-cardiac surgery. They further identified cases where there was a change in attending anesthesiologist. Cases with handovers were associated with an increase in 30-day mortality and postoperative death. Part of the institution's quality improvement initiative was use of a structured handover tool in the Epic electronic health record. Following this institutional move to structured handoffs, there was a decline in apparent risks even with no change in handover frequency. Jeffrey Cooper and Meghan Lane-Fall say this research is a "call-to-action" for anesthesiologists to create a detailed, structured process for transferring patient care to assure that patient information is transferred thoroughly and effectively. This article has a featured author podcast, where the author and editorialist share their views.

23-00971

How do we improve oxygenation in patients with ARDS? That question is explored in our next study. Lung protective ventilation aims at limiting lung stress and strain. The pulmonary consequences of positive pressure mechanical ventilation are mediated by excessive distending pressure. Higher distending pressures are associated with greater risk for mortality in patients with ARDS. Melodie Parfait and colleagues hypothesized that indirect stimulation of the diaphragm would improve oxygenation. In this single-arm, crossover study, researchers enrolled 12 adult patients who were mechanically ventilated with moderate ARDS. A single lumen catheter was inserted into the left subclavian vein and two sets of electrode arrays designed to transvenously and selectively stimulate the left and right phrenic nerves were inserted. Each patient went through four consecutive 60-minute sessions. The second and fourth sessions included diaphragmatic stimulation. Diaphragm stimulation was achieved in all patients, leading to an increase in transdiaphragmatic pressure. This preliminary work suggests that diaphragm neurostimulation could positively effect lung mechanics and hemodynamics.

23-00315

Next, let's look at postoperative complications, which are the third leading cause of death worldwide, with postoperative pulmonary complications the second most common cause after surgical site infection. Protective ventilation with positive end expiratory pressure and alveolar recruitment maneuvers has been shown to reduce postoperative pulmonary complications. More recently, the concept of mechanical power has emerged. Mechanical power is defined as the energy transferred to the respiratory system and the lung during mechanical ventilation. Researchers led by Bertrand Elefrieron hypothesized that mechanical power would be associated with postoperative pulmonary complication rates. In this single-center, retrospective study, researchers reviewed data from patients aged 18 or older who underwent major elective surgery and required general anesthesia with tracheal intubation. Patients were exposed to intraoperative mechanical ventilation following general anesthesia. Six percent of patients developed one or more postoperative pulmonary complications. This study supports the association between intraoperative ventilation and postoperative pulmonary complications and suggests that decreased rather than increased tidal volume, decreased compliance, increased mechanical power, and decreased EtCO<sub>2</sub> were all independently associated with postoperative pulmonary complications.

23-00924

Our next study explores the use of topical lidocaine to treat mechanical neck pain, a leading cause of disability worldwide. Currently, there aren't any approved treatments for neck pain, but some studies have suggested that topical lidocaine may help decrease pain. Steven Cohen and colleagues tested the efficacy of a new lidocaine patch formulation that was recently approved for use in the US for treating mechanical neck pain. In this placebo-controlled crossover trial, they recruited 76 patients with neck pain. Patients were randomized into one of two groups: placebo patch for 4 weeks followed by lidocaine patch after a 1-week washout period, or lidocaine patch followed by placebo after the same washout. There was a small but insignificant difference in pain relief with the lidocaine patch when compared with placebo. Despite the negative findings, the authors call for additional studies evaluating alternative products and dosing methods.

22-01380 and 23-01125

Next, we'll discuss a study that examines how painful peripheral neuropathy might contribute to impaired cognition. Peripheral nerve injury induces changes in astrocytes located in the dorsal hippocampus. Shuang Han and fellow researchers hypothesized that impaired lactate release from dysfunctional astrocytes in dorsal hippocampal CA1 would contribute to memory deficits. They used a spared nerve injury model to induce neuropathic pain in experimental animals. To test behavior, they applied object recognition and conditioned place preference tests. They found that impaired lactate release from dysfunctional astrocytes was associated with memory deficits, and stimulating the locus coeruleus could potentially improve the memory deficits. In an accompanying editorial, Vivianne Tawfik writes that these experiments demonstrate that CA1 astrocytes and their lactic acid release are necessary for pain modulation and memory formation. Further, this work makes a definitive step toward understanding how hippocampal astrocytes contribute to memory deficits in those with chronic pain.

23-00422

In this month's Clinical Focus Review, Justin Richards, Deborah Stein, and Thomas Scalea look at the management and resuscitation of hemorrhagic

shock. Recognizing the importance of altered physiology and hemodynamic resuscitation and correcting coagulopathy are critical in patients with active bleeding. Damage control resuscitation, which has evolved over 20 years, is now the foundation of hemorrhagic shock management. Damage control resuscitation emphasizes rapid identification of hemorrhage, implementation of massive transfusion protocols, resuscitation with plasma-based blood products, and correction of coagulopathy and metabolic derangements. Widespread adoption of damage control resuscitation may lead to earlier recovery. In this review, the authors address damage control resuscitation and the anesthesiologist's role in managing severe traumatic hemorrhage.

23-00340

This month's review article discusses recovery from general anesthesia. Recovery from general anesthesia is a multistep process that requires the

reversal or discontinuation of anesthetic drugs. Today, we lack of drugs that can reverse the unconsciousness induced by general anesthetics. Recovery can be highly variable depending on the anesthetic used, the patient's condition, and the duration of surgery. Drew Cylinder and co-authors examine the ongoing research searching for ways to reverse general anesthesia. Various potential methods including hydrostatic pressure application, receptor-specific antagonists, stimulants, and neural circuit manipulations are described. The review details endpoints that can be used to assess reversal or recovery, and explains how a better understanding of distant pre- and postsynaptic targets could inform future approaches for discovering reversal agents.

Thank you for listening this month. Please join me again next month for highlights from the April 2024 issue.