Perioperative Acute Kidney Injury

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Video Abstract

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Abstract

Over the years, anesthesia has become safer. But surgical morbidity and mortality have barely budged. One of the most persistent challenges is acute kidney injury, or AKI, which occurs in 20 to 40 percent of high-risk surgical patients. Writing in the journal Anesthesiology, researchers from the University of Texas review the latest progress in understanding and treating perioperative AKI. Prior to 2004, there were more than 35 definitions of AKI. A more formalized classification system known as RIFLE created a standard definition. Since then, other systems have emphasized small changes in serum creatinine, and since 2012, the primary system has been Kidney Disease Improving Global Outcomes. AKI is most common in cardiac surgery, but is also frequently observed in thoracic, orthopedic, and vascular surgeries. Risk factors include advanced age, high blood pressure, diabetes, and being African American. Increasingly, it has become clear that AKI isn't limited to the kidney. Instead, it's a multifaceted systemic disease process that can cause problems elsewhere in the body, including the liver, brain, heart, lungs, and immune system. Some studies have also shown that AKI can harm the intestines. Kidney damage triggers Paneth cells located at the bottom of the intestinal crypts to release proinflammatory cytokines that can break down the intestinal barrier. This allows bacteria to enter the bloodstream and set off a potentially fatal cascade of inflammation. Diagnosis of AKI has long depended on measurements of serum creatinine and urine output, which are easy to obtain and specific to the kidney. However, with surgery, urine output is often decreased, making this less informative for perioperative AKI. Similarly, creatinine levels don't rise until the filtration rate has already decreased by half, which often doesn't happen until the second day after surgery. To more quickly identify AKI, researchers are investigating a variety of novel biomarkers that appear earlier in the disease process. However, as of yet, none have convincingly proved their worth. To date, treatment options for AKI are limited to renal replacement therapy. Current evidence does not support N-acetylcysteine, statins, or other supplements to treat or prevent the disease. One experimental strategy is ischemic preconditioning, in which a patient is treated to short periods of ischemia, usually from a blood pressure cuff around the arm. Some studies have shown an effect, but others have not. To learn more about the latest on AKI, including more about ongoing research, check out the entire review today.