Researchers find AKI a predictor of higher mortality rates for stroke patients

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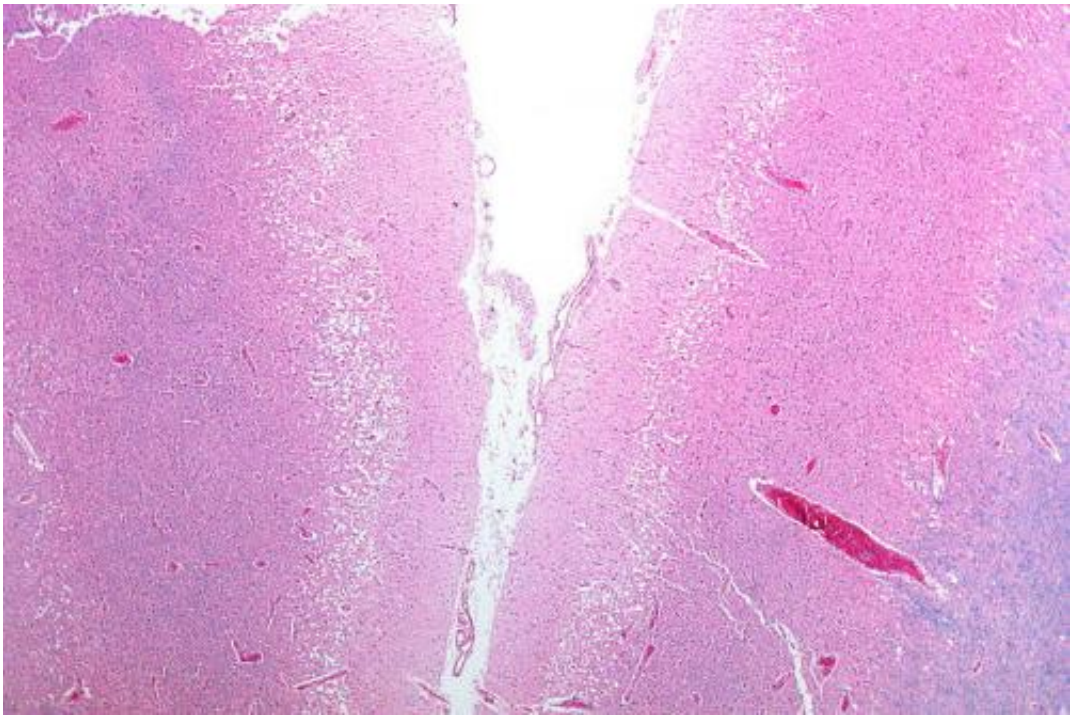

Micrograph showing cortical pseudolaminar necrosis, a finding seen in strokes on medical imaging and at autopsy. H&E-LFB stain. Credit: Nephron/Wikipedia

A University of Cincinnati (UC) researcher, in collaboration with other investigators, has found that ischemic and hemorrhagic stroke patients who suffer from acute kidney injury (AKI) requiring dialysis have higher death rates and greater odds of entering long-term care or nursing facilities after hospitalization.

The study was published online today in *Stroke*, a journal of the American Heart Association.

AKI is a rapid loss of kidney function, which is common in hospitalized patients. It has many causes that include low blood pressure, exposure to substances, drugs or interventions harmful to the kidney and obstruction of the urinary tract.

"Typically when patients are in the hospital for any cardiovascular condition, including stroke, they are in the highest risk of developing acute kidney injury," says Charuhas Thakar, MD, professor and director of the Division of Nephrology and Hypertension at the UC College of Medicine. "Many of these patients are elderly, and they have risk factors that predispose them to AKI such as diabetes.

"Some have pre-existing kidney problems that are recognized or under-recognized before they enter the hospital," says Thakar, a UC Health physician and the senior corresponding author for the research. "The other important factor to consider is as people come in to the hospital, their diagnostic and therapeutic interventions can have side effects, and the kidneys can sometimes be injured."

Thakar, lead investigators Girish Nadkarni, MD, and Achint Patel, MD, and a team of investigators used data involving more than 4.6 million patients in the Nationwide Inpatient Sample from 2002 to 2011 to examine hospitalizations of patients with acute ischemic stroke (AIS) and intracerebral hemorrhage stroke (ICH). The researchers found that AKI requiring dialysis occurred in 1.5 and 3.5 per 1,000 hospitalizations with AIS and ICH, respectively.

Ischemic stroke is the result of reduced blood flow to the brain, typically from an obstruction such as a clot, while hemorrhagic stroke is the result of a hemorrhage in the brain.

During the 10-year period, the researchers found the number of admissions complicated by AKI requiring dialysis nearly doubled from 0.9 per 1,000 patients in 2002 to 1.7 per 1,000 patients in 2011 in acute ischemic stroke, while doubling from 2.1 per 1,000 patients in 2002 to 4.3 per 1,000 patients in 2011 in intracerebral hemorrhagic stroke, says Thakar.

In AIS admissions, AKI requiring dialysis was associated with 30 percent higher odds of mortality and 18 percent higher odds of adverse discharge (placed in a long-term care facility or nursing home) as compared to patients without AKI, he adds.. Similarly, in ICH admissions, AKI requiring dialysis was associated with twice the odds of mortality and 74 percent higher odds of adverse discharge (placed in a long-term care facility or nursing home) as compared to patients without AKI.

"We wanted to look at what are some of the conditions that occur at a higher frequency associated with AKI and stroke," says Thakar. "If a patient comes in with stroke, can the clinician be able to predict which patients will end up with acute kidney injury versus not?

"What we found was the frequency of the following conditions—sepsis, atrial fibrillation, hypertension and prior history of chronic kidney disease—were more likely to be associated with patients with acute kidney injury," says Thakar. "If you came in with stroke and you had any of these four conditions, you were a lot more likely to suffer AKI compared to someone without those conditions.

"When patients come in with stroke, they are much more likely to get CT scans, or they are more likely to get angiograms and other interventions that have known side effects on the kidneys," says Thakar.

The study does not look at specific ways to prevent AKI but is designed

to increase awareness of the true burden of AKI in stroke patients, says Thakar, who notes that physicians can carefully examine predisposing factors such as hypertension and chronic kidney disease and be cautious when using diagnostic or therapeutic options on patients that may have adverse effects on the kidneys.

Thakar says the study has its limitations, adding, "These relationships are observational and not causally linked. More research needs to be done to understand whether this association plays out due to impacts on processes of care, or biology or both."

Thakar says further investigation is needed to examine the connection between ischemic injury and the clinical interaction between the brain and the kidney. "We need to better understand how our ability to protect one vital organ during an episode of ischemic injury could affect the functioning of other vital organs," he says.

The burden of AKI and stroke will continue to challenge the resources of our health care system as our nation's population ages, says Thakar. "We as a health care system should prepare ourselves to expect an increasing need for providing complex long-term care in these patients," he adds.

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