Kidney Impairment Limits Cerebral Blood Flow, May Increase Risk of Stroke and Dementia

By Tracy Hampton

The incidence of stroke is estimated to be 2-7 times higher in patients with chronic kidney disease (CKD) than in individuals with normal kidney function, depending on age and the population studied. Also, patients with CKD have a higher risk of developing dementia than the general population.

Results from a new study indicate that decreased blood flow to the brain may play a role. The study, which is published in the Journal of the American Society of Nephrology, found a link between impaired kidney function, even in patients not diagnosed with CKD, with lower cerebral blood flow (Sedaghat S et al. J Am Soc Nephrol 2015 Aug 6. pii: ASN.2014111118.)

There is increased interest in identifying conditions and risk factors that affect the brain. In recent years, the kidney has received considerable interest, because both the brain and kidney share many characteristics. For example, both are so-called low resistance organs with hemodynamic auto-regulation, meaning that they are capable of regulating the amount of blood that flows through them. Both are also susceptible to damage to the small arteries penetrating them, which can lead to arteriosclerotic small vessel disease. The brain and kidney also share common traditional cardiovascular risk factors, such as hypertension and diabetes. Despite these apparent similarities, the link between kidney disease and brain disease has remained unclear.

A team led by M. Arfan Ikram, MD, PhD, and Sanaz Sedaghat, MSc, of the Erasmus University Medical Center, in the Netherlands, decided to focus on the knowledge that proper kidney function is crucial for regulating blood volume and vascular tone. To study the impact of kidney health on cerebral blood flow, the investigators examined information on 2645 participants in the population-based Rotterdam Study, looking at individuals’ kidney function and blood flow to the brain. The researchers used estimated glomerular filtration rates (eGFR) and albumin-to-creatinine ratios to assess kidney function and acute kidney injury (AKI) is a global problem affecting patients all over the world—but it's not the same everywhere. A prospective, worldwide comparison of AKI patients revealed significant differences in patient characteristics, treatment, and outcomes between developed and emerging countries, according to a study in the Clinical Journal of the American Society of Nephrology.

Led by Ravindra Mehta, MD, of the University of California, San Diego, and Josée Bouchard, MD, of the University of Montreal, the researchers analyzed data on the characteristics, treatment patterns, and outcomes between developed and emerging countries, according to a study in the Clinical Journal of the American Society of Nephrology.

World Study Finds Differences in Acute Kidney Injury Characteristics, Outcomes

As ‘Oby25’ Gets Moving, New Data on Global Burden of AKI

By Timothy O’Brien

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performed phase–contrast magnetic resonance imaging of basilar and carotid arteries to measure cerebral blood flow. Poor kidney function was strongly related to decreased blood flow to the brain, or hypoperfusion, and there was a linear trend between different categories of kidney function and cerebral blood flow. Each 1 standard deviation lower eGFR was associated with 0.42 mL/min per 100 mL lower cerebral blood flow.

Also, poor kidney function was linked to stroke and dementia most strongly in participants with hypoperfusion. These results were independent from known cardiovascular risk factors. The association between higher albumin-to-creatinine ratio and lower cerebral blood flow was not independent of cardiovascular factors, however.

“Our findings provide a possible explanation linking kidney disease to brain disease,” Ikram said. “Also, given that kidney disease and hypoperfusion of the brain are both possibly reversible, there might be an opportunity to explore how improving these conditions can ultimately reduce one’s risk of developing brain disease.”

The study also revealed that the kidney–brain link is not confined to patients with CKD, but extends to individuals without overt disease. Continued research in this area will likely provide important insights on how reduced kidney function may adversely affect the brain. Another recent study by Ikram’s group found that kidney function may have a significant impact on the microstructural integrity of brain white matter, which is composed of nerve fibers and myelin (Sedaghat S et al. Neurology 2015; 85:154–61).

Study co-authors include Meike Vermeulen, MD, PhD, Elizabeth Loehrzer, MSc, Francesco Mattace-Raso, MD, PhD, Albert Hofman, MD, PhD, Aad van der Lugt, MD, PhD, Oscar Franco, MD, PhD, and Abbas Dehghan, MD, PhD.

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The article, entitled “Kidney Function and Cerebral Blood Flow: The Rotterdam Study,” is available at http://jasn.asnjournals.org/content/early/2015/08/05/ASN.2014111118.long.