Etiology and Outcome of Ischemic Stroke in Patients With Renal Impairment Including Chronic Kidney Disease

Japan Stroke Data Bank

Kaori Miwa, MD, PhD, Masatoshi Koga, MD, PhD, Michikazu Nakai, PhD, et al., on behalf of Japan Stroke Data Bank Investigators

Cite as: Neurology® 2022;98:e1738-e1747. doi:10.1212/WNL.0000000000200153

Study Question
What are the most common etiologies of stroke in patients with renal impairment and what is their association with outcome?

What Is Known and What This Paper Adds
The mechanisms of increased stroke risk in patients with chronic kidney disease (CKD) remain unclear, with possible contributions from shared traditional vascular risk factors and nontraditional risk factors induced by renal dysfunction. There is uncertainty regarding the predominant ischemic stroke subtypes and their outcomes in patients with CKD. This study demonstrates that the most common etiology of stroke in patients with renal impairment is cardioembolic stroke and that the prognosis is worse in patients with cardioembolic stroke and small vessel occlusion.

Methods
This study includes data from 10,392 adult patients with acute stroke enrolled in the Japan Stroke Data Bank, a nationwide, hospital-based, multicenter prospective stroke registry, between October 2016 and December 2019, who had available baseline serum creatinine levels or a dipstick proteinuria. We defined renal impairment as estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m², elevated proteinuria, or both on the baseline test. The ischemic stroke etiology was classified according to the Trial of Org 10172 in Acute Stroke Treatment (TOAST) criteria. Unfavorable functional outcome was defined as modified Rankin Scale (mRS) score 3–6 at discharge. Mixed effect logistic regression was used to determine the relationship between the outcomes and the eGFR strata (<45, 45–59, ≥60 mL/min/1.73 m²), or dipstick proteinuria ≥1 adjusted for covariates. We also performed restricted cubic spline analyses to explore the overall association between eGFR and ischemic stroke subtypes or its functional outcomes.

Results and Study Limitations
Of all studied patients, 4,395 (42%) had eGFR <60, of whom 2,419 (23%) had eGFR 45–59 and 1,976 (19%) had eGFR <45 mL/min/1.73 m², including 185 patients (1.8%) who were on hemodialysis. Baseline eGFR 45–59 and eGFR <45 mL/min/1.73 m² were associated with a higher proportion of cardioembolic stroke (odds ratio [OR], 1.21 [95% CI, 1.05–1.39] and 1.55 [1.34–1.79], respectively) and a lower proportion of small vessel occlusion (0.79 [0.69–0.90] and 0.68 [0.59–0.79], respectively), which was observed in linear relationship. An eGFR <45 mL/min/1.73 m² and proteinuria were each associated with unfavorable outcomes in patients with cardioembolic stroke (OR, 1.30 [95% CI, 1.01–1.69] and 3.18 [2.03–4.98], respectively) and small vessel occlusion. Lower level of eGFR at <40 mL/min/1.73 m² was associated with an unfavorable outcome in patients with small vessel occlusion and cardioembolic stroke and higher eGFR was associated with unfavorable outcome in patients with cardioembolic stroke (Figure). Limitations of this study include the lack of preadmission or repeated measurements of renal function; this could limit accurate identification of the clinical effect of renal impairment on stroke outcome.

Study Funding and Competing Interests
The study was funded by a grant from Ono Pharmaceutical (C608-1) and a Grant-in-Aid for Scientific Research (19K19373). One of the authors reports additional disclosures. Go to Neurology.org/N for full disclosures.

Copyright © 2022 American Academy of Neurology

707
Etiology and Outcome of Ischemic Stroke in Patients With Renal Impairment Including Chronic Kidney Disease: Japan Stroke Data Bank
Kaori Miwa, Masatoshi Koga, Michikazu Nakai, et al.
Neurology 2022;98:e1738-e1747 Published Online before print March 8, 2022
DOI 10.1212/WNL.00000000000200153

This information is current as of March 8, 2022