Editorial

https://doi.org/10.4070/kcj.2017.0066
Print ISSN 1738-5520 • On-line ISSN 1738-5555

kcj
Korean Circulation Journal

PCI or CABG, That is the Question!

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Chronic kidney disease (CKD) is a strong risk factor for cardiovascular morbidity and mortality. However, these patients are frequently excluded from randomized, controlled trials aimed to determine the optimal revascularization strategy percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG). Additionally, CKD patients frequently experience further kidney injury, procedural complications, and death after PCI or CABG. This is concerning because the major cause of mortality in CKD patients is cardiovascular death, rather than progression to end-stage renal disease requiring dialysis. Although it is unclear which treatment is optimal for coronary artery disease, some observational and subgroup analyses have shown that CABG is associated with better survival than PCI in patients with severe kidney disease.[1] Patients with CKD are more likely to have complex lesions, diffuse disease, extensive calcification, small vessel disease, high prevalence of diabetes, and multivessel disease compared to patients without CKD. These factors lead to more bleeding complications, higher restenosis rates, and a higher risk for death after PCI. Revascularization by CABG is also problematic in CKD patients because of increased rates of bleeding and early mortality.

Received: March 27, 2017
Revision Received: April 12, 2017
Accepted: April 13, 2017
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• The authors have no financial conflicts of interest.

Kang et al.[2] found patients with CKD who had undergone PCI for multivessel disease had similar all-cause mortality adjusted hazard ratio (HR), 0.907; 95% confidential interval (CI), 0.765-1.089, stroke (HR, 0.926; 95% CI, 0.569-1.607), and primary outcome (composite of all-cause mortality, myocardial infarction (MI), and stroke; HR, 0.941; 95% CI, 0.791-1.120) compared to patients who had undergone CABG during a 41-month follow-up period. As expected, PCI was associated with a higher risk of repeated revascularization. Another patient-level meta-analysis of patients with CKD randomized to CABG or PCI reported that CABG significantly reduced the risk of MI and repeated revascularization without affecting survival.[3] In addition, 1- and 5-year outcomes were similar in patients undergoing hemodialysis or peritoneal dialysis.

As the authors mentioned, this study was a single-center, nonrandomized, observational study. There is considerable risk of selection bias because the patients undergoing PCI were relatively healthy (less diabetes, heart failure, and triple vessel disease; higher ejection fraction). This study combined results of both 2-vessel and 3-vessel diseases, which minimized the benefits of CABG in patients with 3-vessel disease.[4][5] Additionally, this study did not show the complexity of coronary lesions. Until now, there has been no data about the usefulness of SYNTAX score or other anatomical scores in CKD patients. In this study, there was no report of medical treatment. We assumed that patients were prescribed "optimal" medications; however, the "optimal" medical therapy in CKD patients is not well defined, as the majority of randomized trials have consistently excluded this high-risk group of patients. The elevation of serum creatinine is possible with treatment by renin-angiotensin system inhibitors in CKD patients. The ISCHEMIA-CKD (NCT01985360) trial is currently ongoing in patients with advanced CKD (glomerular filtration rate <30 mL/min/1.73 m^2 or on dialysis) who had an abnormal stress test. This will be the largest treatment strategy trial in patients with advanced CKD and will provide needed insight into management of this high-risk population. Finally, there is mixed data regarding drug-eluting stents. PCI with everolimus-eluting stents has been shown to improve short-term mortality and

stroke in a propensity matched study.[6] As in this study, PCI was associated with a similar risk of death, lower risk of stroke, and higher risk of repeated revascularization in the long term. It remains to be determined whether the use of new-generation DES improves outcomes among patients with CKD and multivessel CAD.

In patients with normal kidney function, antiplatelet therapy reduces the risk of subsequent MI, stroke, and cardiovascular death. There is little data related to the effects or safety of antiplatelet therapy in patients with CKD. A meta-analysis showed that antiplatelet therapy significantly reduced the incidence of fatal or nonfatal MI (3 MI prevented for every 1000 patients treated) compared to both placebo or no therapy, although there were increased major bleeding events (15 additional major bleeding events for every 1000 patients treated).[7] Surprisingly, CKD is an important risk factor for high platelet reactivity to standard clopidogrel therapy. Detailed attention is need in patients with CKD who are at highest risk for thrombotic events (and consequently might benefit the most from intensive antiplatelet therapy) but who are also at high risk for bleeding. A new $P2Y_{12}$ inhibitor might be an option for these patients because ticagrelor reduced ischemic events and mortality without significantly increasing major bleeding with its rapid onset/offset effects.[8][9] Treatment of coronary artery disease in patients with CKD currently follows the protocol for treatment in patients with normal kidney function. In cardiovascular therapy, there is no data about drug dose adjustments in patients with CKD, which is an important factor for drug-related adverse effects. Additional research is needed to improve clinical outcomes in these high risk patients.

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