Cardiorenal syndrome

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■ Cite as: *CMAJ* 2023 September 5;195:E1154. doi: 10.1503/cmaj.230226

1 Cardiorenal syndrome is a bidirectional pathophysiological interaction between the heart and kidneys[1]

It occurs because of acute or chronic dysfunction in one organ leading to dysfunction in the other. Underlying mechanisms include arterial underfilling, neurohormonal activation, venous congestion and endothelial dysfunction.[1]

2 It is associated with increased mortality among patients with heart failure[2]

Around 60% of patients with decompensated heart failure have chronic kidney disease (CKD) with an estimated glomerular filtration rate (eGFR) of less than 60 mL/min/1.73 m^2.[2] Patients with heart failure and CKD have a 27% increase in mortality, compared with patients with heart failure and normal renal function. A decrease in eGFR by 10 mL/min/1.73 m^2 increases mortality by 15%.[2]

3 Patients with cardiorenal syndrome should be treated with angiotensin-converting-enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs)[1]

These agents reduce risk of death and prolong time to end-stage kidney disease.[1] Both ACE inhibitors and ARBs should be titrated to the maximum tolerated dose, provided that the patient has no symptomatic hypotension or hyperkalemia.[3] Although angiotensin receptor–neprilysin inhibitors can be used in place of ACE inhibitors or ARBs for heart failure, their renal protective effects are unknown.

4 Sodium–glucose cotransporter-2 (SGLT2) inhibitors should be added to ACE inhibitors or ARBs for renal and cardiovascular protection[1,4]

Once a patient's eGFR is stable (> 20 mL/min/1.73 m^2) for 3 months on an ACE inhibitor or an ARB, an SGLT2 inhibitor should be started, such as empagflozin (10 mg/d). Independent of diabetes, SGLT2 inhibitors reduce the risk of renal failure progression by 37%.[4]

5 Patients with cardiorenal syndrome benefit from guideline-directed medical therapy[5]

Patients with an eGFR of less than 60 mL/min/1.73 m^2 or with an estimated 5-year risk of kidney failure greater than 5% are at high risk for worsening kidney disease and referral to nephrology should be considered. Engaging primary care physicians, transitional care at hospital discharge and multidisciplinary clinic follow-up may increase uptake of guideline-directed medical therapy.[5]

References

1. Rangaswami J, Bhalla V, Blair JEA, et al. Cardiorenal syndrome: classification, pathophysiology, diagnosis, and treatment strategies: a scientific statement from the American Heart Association. *Circulation* 2019;139:e840-78.
2. Smith GL, Lichtman JH, Bracken MB, et al. Renal impairment and outcomes in heart failure: systematic review and meta-analysis. *J Am Coll Cardiol* 2006;47:1987-96.
3. Bhandari S, Mehta S, Khwaja A, et al.; STOP ACEi Trial Investigators. Renin-angiotensin system inhibition in advanced chronic kidney disease. *N Engl J Med* 2022;387:2021-32.
4. Nuffield Department of Population Health Renal Studies Group; SGLT2 inhibitor Meta-Analysis Cardio-Renal Trialists' Consortium. Impact of diabetes on the effects of sodium glucose co-transporter-2 inhibitors on kidney outcomes: collaborative meta-analysis of large placebo-controlled trials. *Lancet* 2022;400:1788-801.
5. Jalloh MB, Granger CB, Fonarow GC, et al. Multi-level implementation strategies to improve uptake of evidence-based therapies in heart failure. *Eur Heart J* 2023 Apr. 15. [Epub ahead of print]. doi: 10.1093/eurheartj/ehad150.

Competing interests: Bourne Auguste has received speaking honoraria from Amgen and Baxter Healthcare. No other competing interests were declared.

This article has been peer reviewed.

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