

Assessment of Renal Function in Patients with Heart Failure

Alfredo Jose Mansur¹ and Victor Sarli Issa²

Instituto do Coração do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo,¹ São Paulo, SP - Brazil
University Hospital Antwerp,² Edegem, Antwerp - Belgium

Short Editorial related to the article: Type 1 Cardiorenal Syndrome in Decompensated Heart Failure Patients in a Low-Income Region in Brazil: Incidence of Acute Kidney Injury (AKIN and KDIGO Criteria), Need for Dialysis and Mortality

Heart failure is a systemic condition that may lead to impairment of many organ systems and physiological functions that may cause symptoms and may have a negative influence in the prognosis of the patients.^{1,2} Compromising renal function may be one of the ailments of patients with heart failure.^{2,3}

Prevention, diagnosis and treatment of this complication are key issues in patient care; strategies of categorization of acute renal lesions have been developed and are helpful in clinical practice.¹

A first step would be to study local experience to estimate its frequency, clinical characteristics and evaluation of severity. Causes of acute kidney injury were recognized to vary by country and economic status.⁴ This important step was provided in a retrospective study based on hospital charts of a referral hospital in a Brazilian northeast state capital to address the comparison of two methods of evaluating renal dysfunction.⁵

They studied⁵ a sample of 81 patients admitted to the Hospital, diagnosed with heart failure (16 of them with recent myocardial infarction), mean age 67 years, men (53%) and women (47%). Acute kidney injury was diagnosed in 50/81 patients; mortality was 16/50 (32%) in patients with acute kidney injury and 3/31 (9,68%) in patients without acute kidney injury. Dialysis was performed in three patients with acute kidney injury. The authors found that the KDIGO score (Kidney Disease: Improving Global Outcomes) indicated renal injury in 61,7% of the cases; the AKIN (Acute Kidney Injury Network) criteria did not indicate acute renal lesion in 14% of the patients. The authors concluded that a relationship between the cardiac conditions in this study sample did not demonstrate a clear relationship with acute kidney lesions; the scores did

not demonstrate a significant difference in performance for guidance in the diagnosis of acute kidney lesions.

Prevention is a key step in patient care. Prevention of acute kidney injury may be part of the care of patients with heart failure and include: control of contributing factors to the occurrence and development of both renal and cardiac dysfunctions (such as diabetes mellitus and arterial hypertension); prevention and control of factors aggravating kidney function such as hypovolemia, hypotension and use of nephrotoxic agents; prevention and control of factors aggravating heart function such as hypo- and hypervolemia, acute blood pressure abnormalities, ischemia and use of drugs that could impair the heart function, and others; appropriate treatment of heart failure with disease-modifying therapies and, ideally, use of therapies that could positively impact the renal function.

In the event of established acute kidney injury, early diagnosis or prompt diagnosis may be crucial and the use of appropriate diagnostic criteria play a central role. One of the most used markers in medical practice is serum creatinine and elevation equal to or greater than 0.3 mg/dl has been associated with increased risk of hospital death and prolonged hospitalization. However, the non-linear relationship between creatinine and glomerular filtration rate and the influence of factors such as metabolic status, age, gender, race, and nutritional status limit an accurate application in clinical practice.⁶

A way to compensate for these limitations was the development of equations for calculating glomerular filtering rate using variables such as sex, age, race, and body surface area. The most commonly used equations are Cockcroft-Gault, MDRD (Modification of Diet in Renal Disease) and CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration). Despite being more accurate, they also face limitations in special populations such as elderly, underweight, obese and diabetic patients.

Scores frequently used in clinical practice use either creatinine (AKIN), glomerular function estimates (KDIGO) or a combination of both (RIFLE), in association with other data, such as albuminuria. Other markers of renal function including kidney injury molecule 1 (KIM1), isoform 1, N-acetyl- β -D-glycosaminidase (NAG), interleukin 18, cystatin C, neutrophil gelatinase-associated lipocalin (NGAL), and urinary exosomes are currently under investigation.⁷

Keywords

Heart Failure/complications; Kidney Diseases/complications; Prognosis; Prevention and Control; Risk Factors; Hypertension; Diabetes Mellitus; Hypovolemia.

Mailing Address: Alfredo Jose Mansur •

Instituto do Coração, Faculdade de Medicina da Universidade de São Paulo - Cardiologia Clínica, Ambulatórios Gerais - Av. Dr. Enéas de Carvalho Aguiar, 44. Postal Code 05403-000, São Paulo, SP - Brazil
E-mail: ajmansur@cardiol.br, ajmansur@incor.usp.br

DOI: <https://doi.org/10.36660/abc.20210467>

References

1. Thomas ME, Blaine C, Dawney A, Devonald MA, Ftouh S, Laing C, et al. The definition of acute kidney injury and its use in practice. *Kidney Int.* 2015 Jan;87(1):62-73. doi: 10.1038/ki.2014.328.
2. Villacorta H, Villacorta AS, Villacorta LSC, Xavier AR, Kanaan S, Rohen FM, et al. Worsening Renal Function and Congestion in Patients with Acute Heart Failure: A Study with Bioelectrical Impedance Vector Analysis (BIVA) and Neutrophil Gelatinase-Associated Lipocalin (NGAL). *Arq Bras Cardiol.* 2021 Apr;116(4):715-24.
3. Leite AM, Gomes BFO, Marques AC, Petriz JLF, Albuquerque DC, Spinetti PPM, et al. Acute Cardiorenal Syndrome: Which Diagnostic Criterion to Use And What is its Importance for Prognosis? *Arq Bras Cardiol.* 2020 Jul;115(1):127-33.
4. Mehta RL, Burdmann EA, Cerdá J, Feehally J, Finkelstein F, García-García G, et al. Recognition and management of acute kidney injury in the International Society of Nephrology 0by25 Global Snapshot: a multinational cross-sectional study. *Lancet.* 2016 May 14;387(10032):2017-25. doi: 10.1016/S0140-6736(16)30240-9. Erratum in: *Lancet.* 2016 May 14;387(10032):1998.
5. Nascimento GVR, Brito HCD, Lima CEB. Type 1 Cardiorenal Syndrome in Decompensated Heart Failure Patients in a Low-Income Region in Brazil: Incidence of Acute Kidney Injury (AKIN and KDIGO Criteria), Need for Dialysis and Mortality. *Arq Bras Cardiol.* 2021; 117(2):385-391. doi: <https://doi.org/10.36660/abc.20200097>.
6. Blair JE, Pang PS, Schrier RW, Metra M, Traver B, Cook T, et al. EVEREST Investigators. Changes in renal function during hospitalization and soon after discharge in patients admitted for worsening heart failure in the placebo group of the EVEREST trial. *Eur Heart J.* 2011 Oct;32(20):2563-72. doi: 10.1093/eurheartj/ehr238.
7. Lassus JP, Nieminen MS, Peuhkurinen K, Pulkki K, Siirilä-Waris K, Sund R, et al. FINN-AKVA study group. Markers of renal function and acute kidney injury in acute heart failure: definitions and impact on outcomes of the cardiorenal syndrome. *Eur Heart J.* 2010 Nov;31(22):2791-8. doi: 10.1093/eurheartj/ehq293.



This is an open-access article distributed under the terms of the Creative Commons Attribution License