Short Communication

Acute kidney injury in COVID-19: irrational use of drugs in clinical practice

Abstract

Acute kidney injury is associated with higher mortality in COVID-19 patients. The causes of acute kidney injury can be stratified into three: due to direct cytopathogenic effect, secondary damage due to the coexistence of the inflammatory response or due to the patient's therapy. It is the last point at which you must have the best criteria to make the correct decisions, based on evidence. The administration of antibiotics in patients with COVID-19 is directly related to the critical judgment of the clinician and his experience, therefore, the prescription of antibiotics in patients with SARS-CoV-2 infection should be avoided as clinical practice of outpatient or hospital management, if the presence of a concomitant bacterial infection has not been evidenced in any way. Selective or multiple treatment of COVID-19 patients should be based on physiological knowledge and principles; as well as those of the natural history of the disease, pathophysiology and a critical analysis of the available information; but not only the experience -which is scarce in this disease-, maintaining a focus on evidence-based medicine.

Keywords: COVID-19, severe acute respiratory syndrome coronavirus 2, acute kidney injury, evidence-based medicine, evidence-based emergency medicine, evidence-based practice

Correa- Prieto Franklin Rouselbel

Emergency Department, National Police Hospital Luis Nicasio Sáenz / Lima, Perú

Correspondence: Correa- Prieto Franklin Rouselbel, Emergency Department, National Police Hospital Luis Nicasio Sáenz, Medicine. Emergencies and Disasters, Second specialty program, School of Medicine, San Martín de Porres University, Master of Health Services Management, Pos Graduate School, Cesar Vallejo University. Jesus Maria. Lima, Peru, Tel + 51-1-971 153 817, Email fcoreap@ucvvirtual.edu.pe, franklincorrea@usmp.pe, dr.correa.p@gmail.com

Abbreviations: COVID-19, coronavirus disease; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2

Introduction

The COVID-19 disease has had a rapid spread throughout the world, currently with a presence in 190 countries almost a year after the first case report in Wuhan, China ; with a total of 45,967,061 infected and 1,194,325 deaths to date.[1] Its clinical characteristics are variable; which can be grouped into two sets : respiratory signs, symptoms mild to severe that can take up shock and respiratory failure; and with extrapulmonary manifestations; presenting with hepatic, gastrointestinal, metabolic dysfunction, neuropathies, acute kidney injury; mainly.[2] Acute kidney injury is defined by a rapid increase in serum creatinine to a value greater than or equal to 1.5 times its baseline or an increase of 0.3 mg / dl in any 48-hour period; the decrease in urine production in a flow less than or equal to 0.5 ml / kg in a period equal to or greater than 6 hours, or the presence of both in less than seven days.[3]

However, how to assess the 1.5-fold increase in creatinine if the baseline value is unknown? Or How feasible is the parameter of increase in 0? 3mg/dl in any period of 48 hours in patients who persistently present hydroelectrolyte imbalances typical of the severe or critical stage of infection by SARS-CoV-2? Patients admitted to the emergency room due to SARS-CoV-2 infection have usually been previously medicated at home or by outpatient in the best of cases, in contrasted realities ; as in societies with fragmented health systems, weak economies, and diverse cultural nuances; In addition to the non-regulation of the sale of drugs such as antibiotics, health service users maintain self-medication[4] and only go to the emergency room due to the progression of the symptoms of SARS-CoV-2 infection; usually presenting a spectrum from moderate to critical, with metabolic, hydroelectrolyte, liver disorders already established, others in shock.

Acute kidney injury is associated with higher mortality in COVID-19 patients. The causes of acute kidney injury can be stratified into three: by direct cytopathogenic effect, secondary damage due to the coexistence of the inflammatory response or as a consequence of the patient's therapy.[5] It is the last point in which as clinicians you must have the best criteria to make the correct decisions, based on evidence. It should conceptualise the kidneys eliminate most of the drug s in the human body and its metabolites; Likewise, excessive or unnecessary administration is a high risk for patient safety,[6] and the non- rational use of antibiotics such as beta-lactams, cephalosporins, carbapenems, quinolones and aminoglycosides, is the cause of acute kidney injury.[7]

The acute kidney injury is caused by 40% by drugs such as antibiotics and up to 60% if associated with combination therapy, in young patients or elderly; its progression is greater if an antibiotic treatment has been prescribed unnecessarily or unregulated; the main lesions described being acute tubular necrosis and acute interstitial nephritis.[7] An estimated time between the onset of acute kidney injury and the use of antibiotics in patients with SARS- CoV-2 infection has not been standardized; however, an estimated time equal to or greater than eight (8) days of antibiotic exposure has been described ; however, it can occur 72 hours after exposure to the drug, considering cephalosporins, penicillins and carbapenems in this group ; defined acute kidney injury by doubling the patient's baseline serum creatinine.[8] Likewise, it should be considered that a patient infected by SARS-CoV-2 has the need for multiple treatment ; and it is usual in the therapeutics of the clinician to prescribe drugs with the function of gastric protectors, the most common being the proton pump inhibitors.

However, the use of proton pump inhibitor drugs is associated with an increased risk of progression of the severity spectrum of SARS-CoV-2 infection; this as a function of leading to a state of recurrent acute interstitial nephritis associated with

humoral hypersensitivity.[9] Standardized predictive parameters of acute kidney injury are necessary for this type of patient, allowing an early therapeutic approach and the allocation of necessary resources, including the probability of dialysis therapy, as appropriate. Until now, no predictive or severity laboratory values have been standardized; however, albumin concentration less than 2mg/dl and antithrombin III less than or equal to 70% have been described as predictive values.[10]

Likewise, computed tomography has a transcendental role in assessing the damage caused by SARS-CoV-2, this time with an extrapulmonary approach. Observe and measure particularities such as the attenuation of the renal parenchyma, peripheral fat strand; they are useful in the diagnosis of acute kidney injury in patients with COVID-19 regardless of their spectrum of disease.[11] It should be noted that the serological and tomographic parameters do not provide the etiology of acute kidney injury in patients with COVID-19.

The administration of antibiotics in patients with COVID-19 is directly related to the critical judgment of the clinician and his experience,[12] therefore, the prescription of antibiotics in patients with infection of the virus should be avoided as usual clinical practice. SARS-CoV-2 from outpatient or hospital management; if the presence of a concomitant bacterial infection has not been evidenced in any way , due to the release of Toll- like receptors and intestinal endotoxins.[13] Selective or multiple treatment of COVID-19 patients should be based on physiological knowledge and principles; as well as those of the natural history of the disease, pathophysiology and a critical analysis of the available information; but not only experience - which is scarce in this disease -, maintaining a focus on evidence-based medicine.[14]

Acknowledgments

None.

Conflicts of interest

The author declares no conflict of interest.

References

1. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases*. 2020;20(5):533–534.

2. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020;395(10223):497-506.

3. Ronco, Claudio, Rinaldo Bellomo, et al. Acute kidney injury. *The Lancet*. 2020;394.10212:1949-1964.

4. Molento, Marcelo Beltrão. COVID-19 and the rush for self-medication and self-dosing with ivermectin: A word of caution. *One* Health. 2020;100148.

5. Zheng, Xizi, Youlu Zhao, et al. *Acute Kidney Injury in COVID-19: The Chinese Experience*. Seminars in Nephrology. WB Saunders, 2020.

6. Kelly, Niamh, Conor Byrne. Nephrotoxins and drugs in renal insufficiency. *Medicine*. 2019;47(8):517–522.

7. Morales-Alvarez, Martha Catalina. Nephrotoxicity of Antimicrobials and Antibiotics. *Advances in Chronic Kidney Disease*. 2020;27(1):31–37.

8. Lazarus, Benjamin. Time to Acute Kidney Injury in β-Lactam− Induced Acute Interstitial Nephritis. *Kidney international reports*. 2020;5(7):1068–1070.

9. Hariyanto, Timotius Ivan, Ignatius Bima Prasetya, et al. *Proton pump inhibitor use is associated with increased risk of severity and mortality from coronavirus disease 2019 (COVID-19) infection. Digestive and Liver Disease*. 2020.

10. Gross, Oliver. COVID-19-associated nephritis: early warning for disease severity and complications?. *The Lancet*. 2020;395(10236):87–88.

11. Huang, Qiang. COVID-19 associated kidney impairment in adult: Qualitative and quantitative analyses with non-enhanced CT on admission. *European Journal of Radiology.* 2020; 131:109240.

12. Chang, Chien-Yi, Kok-Gan Chan. Underestimation of co-infections in COVID-19 due to non- discriminatory use of antibiotics. *Journal of Infection*. 2020;81(3):29–30.

13. Asaduzzaman, Muhammad, Farzana Zaman, and Emily Rousham. Antibiotic consumption may be linked to exaggeration of COVID-19. *Medical Hypotheses*. 2020;143:109913–109913.

14. Pieralli, Filippo, Vieri Vannucchi, et al. The eighth alternative to Evidence Based Medicine in the early era of the COVID-19 pandemic: too much Emergency and Emotion, too little Evidence. *European Journal of Internal Medicine*, 2020.