Green Effluent in a Patient on Continuous Veno-venous Hemodiafiltration

Priscila Dias Gonçalves,1,2 Geraldo Rubens Ramos de Freitas,1,2 and Thiago de Azevedo Reis2

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Clinical Images in Nephrology and Dialysis

Case Report

A 50-year-old male patient with a past medical history of severe mitral stenosis and tricuspid regurgitation secondary to rheumatic valvular heart disease was admitted to the hospital with heart failure New York Heart Association class IV. Thirteen years before admission, the patient underwent coronary artery bypass graft surgery due to three-vessel atherosclerotic disease. Successful long-term bypass patency shown in cineangiocoronariography was performed on admission. Mechanical mitral valve replacement and tricuspid valvuloplasty with 170 minutes of extracorporeal circulation and 110 minutes of aortic crossclamping time were attempted.

The patient developed recurrent, nonsustained ventricular tachycardia with global myocardium ischemia and was admitted to the intensive-care unit with refractory cardiac shock and Kidney Disease Improving Global Outcomes stage 3 AKI. Continuous venovenous hemodiafiltration was initiated and methylene blue was added to the arsenal of vasoactive drugs and 30 minutes later the effluent fluid was green in color (Figure 1).

Discussion

Continuous venovenous hemodiafiltration is widely used as a RRT modality on patients with AKI (1). It usually generates a yellow citrine outflow that is stored as effluent (Figure 2). Specific clinical situations may result in abnormal effluent aspect.

Methylene blue is a synthetic basic dye with a low molecular mass of 319.9 Da (2); it is a guanosine monophosphate blocker that may increase mean arterial pressure and decrease NE requirements in refractory hypotension postcardiopulmonary bypass and septic shock, however, the clinical utility of this drug is unclear (3).

Solutes are divided according to molecular mass into small (<500 Da), middle (500–15,000 Da), and large (>15,000 Da) molecules. The removal of some molecules during dialysis are well established, such as urea (60 Da), creatinine (113 Da), vitamin B12 (1335 Da), β2 microglobulin (18.8 KDa), and albumin (66 KDa) (1).

Despite the absence of studies evaluating the removal of methylene blue, it is expected to have a high clearance due to its low molecular mass.

Green urine was already reported after administration of methylene blue. A green color in urine is reported in association with drugs with a phenol group—such as promethazine, thymol, cimetidine, and propofol—after they are conjugated in the liver, (4) as well as with nonphenol molecules—such as metoclopramide, amitriptyline, and indomethacin (4). Also, Pseudomonas infections may cause green urine due to the production of pyocyanin green pigment. Methylene blue can be confirmed when detected by spectrophotometry with an absorbance at 660 and 609 nm (5).

Green dialysate reports are not currently available in the literature. The green-colored effluent most likely developed due to an additive effect of the methylene blue with the usual citrine yellow effluent color. Unfortunately, we could not investigate the presence of methylene blue in effluent solution, nor evaluate its removal.

Teaching Points

- Methylene blue is a synthetic basic dye with a low molecular mass.
- Green-colored effluent and urine most likely occur due to the combination of yellow citrine in these fluids and blue added by various drugs.
- Methylene blue in continuous RRT effluent can be confirmed with spectrophotometry.

Author Contributions

P. Dias Gonçalves and G. Ramos de Freitas wrote the original draft of the manuscript; G. Ramos de Freitas and T. Reis were responsible for data curation; all authors conceptualized the study, and reviewed and edited the manuscript.

Disclosures

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1Department of Transplantation, University of Brasilia, Brasilia, Brazil
2Department of Nephrology and Kidney Transplantation, Kidney Disease Clinic of Brasilia, Brasilia, Brazil

Correspondence: Dr. Priscila Dias Gonçalves, Department of Nephrology and Kidney Transplantation, Clínica de Doenças Renais de Brasília (CDRB), SEPS 710/910 A 1, Vital Brasília - Asa Sul, Brasília - DF 70390-108, Brasil. Email: prisciladiasgoncalves@gmail.com
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Figure 1. | Continuous venovenous hemodiafiltration with green outflow stored in the effluent bag.

Figure 2. | Continuous venovenous hemodiafiltration with yellow citrine outflow stored in the effluent bag.