

# What is happening in that urinary catheter bag?

Valentina Antoci,<sup>1</sup> Valentina Ferrari,<sup>2</sup> Alessandro Dacrema<sup>2</sup>

<sup>1</sup>Internal Medicine, IRCCS San Matteo Hospital, Pavia; <sup>2</sup>Emergency Department, Guglielmo da Saliceto Hospital, Piacenza, Italy



An 86-year-old nursing home woman with an indwelling urinary catheter presented to our emergency department for abdominal pain, nausea, hyporexia after nine days of stubborn constipation despite the use of laxatives, on a background of IV stage Chronic Kidney Disease (CKD), type 2 diabetes, hypothyroidism, and bed rest syndrome with chronic pain treated with fentanyl transdermal patch. Blood tests showed a worsening of renal function (creatinine 5.7 mg/dL, nv 0.6-1; azotemia 177 mg/dL, nv 10-50), and increased C reactive protein value (5 mg/dL, nv < 0.5). Glucose and serum electrolytes were normal. Abdomen X-ray was unremarkable, and PoCUS excluded hydronephrosis and bladder globe. The urine drainage bag was purple with smelly urine.

## Question

Given the patient's history and the purple colour of the urinary catheter bag, what is the most likely diagnosis that can explain the clinical condition of this patient?

1. Nephrolithiasis
2. Metabolic myoglobinuria
3. Purple urine bag syndrome
4. Acute intermittent porphyria

Correspondence: Alessandro Dacrema, Emergency Department, Guglielmo da Saliceto Hospital, Via Giuseppe Taverna 49, Piacenza, Italy.

Tel.: +39.0523.303044

E-mail: alessandro.dacrema01@gmail.com

Key words: purple urine bag syndrome; urinary catheterization; urinary tract infection; purple urine; Escherichia coli; Klebsiella pneumoniae.

Contributions: VA drafted the manuscript. AD and VF cared for the patient. AD collected clinical data and critically revised the manuscript. All the authors approved the final version and stated the integrity of the whole work.

Conflicts of interest: The Authors declare no conflict of interest.

Availability of data and materials: all data are available upon reasonable request to the corresponding author.

Ethics approval and consent to participate: as this was a descriptive case report and data was collected without patient identifiers, ethics approval and informed consent were not required under our hospital's Institutional Review Board guidelines. There are no sources of support.

Received for publication: 4 November 2022.

Revision received: 6 December 2022.

Accepted for publication: 6 December 2022.

This work is licensed under a Creative Commons Attribution 4.0 License (by-nc 4.0).

©Copyright: the Author(s), 2022

Licensee PAGEPress, Italy

Emergency Care Journal 2022; 18:10990

doi:10.4081/ecj.2022.10990

*Publisher's note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher; the editors and the reviewers. Any product that may be evaluated in this article or claim that may be made by its manufacturer is not guaranteed or endorsed by the publisher.*

## Answer

The urinalysis revealed bacteriuria and alkaline pH resulting positive for *Escherichia coli* and *Klebsiella pneumoniae*, supporting the diagnosis of Purple Urine Bag Syndrome (PUBS). PUBS is a bright purple discoloration of the lining and tubing of urinary catheter bag occurring in patients, especially those in the bedridden state, on long-term urinary catheterization, caused by Urinary Tract Infections (UTI) by bacteria producing sulfatase or phosphatase.<sup>1-3</sup> PUBS was described in 1812 when physicians taking care of King George III noted bluish discoloration in his urine.<sup>4</sup> In the literature the first case is reported in 1978.<sup>5</sup> Constipation and use of laxatives are frequently reported among patients with PUBS, supporting the fact that a decrease in intestinal motility causes bacterial overgrowth in the intestine increasing the metabolism of tryptophan to indole and resulting in high levels of indigo (blue) and indirubin (red) pigments in the urine, responsible for the purple colour of urine.<sup>1-3,6</sup> The most common bacteria associated with PUBS are gram-negative, including *E. coli*, *Enterococcus species*, *Proteus mirabilis*, *Morganella*, and *Klebsiella pneumoniae*.<sup>7</sup> The interaction between the bag (*i.e.*, the plastic) and pigments as well as a high bacterial load is important in precipitating PUBS.<sup>6</sup> Risk factors for PUBS are female gender, institutionalization, dementia, constipation, long-term catheterization, CKD, dehydration, increased dietary tryptophan, alkaline urine, and the use of a Polyvinylchloride (PVC) plastic catheter.<sup>3</sup> Discoloration of the urine bag can appear between 2–3 months and one year of catheterization. PUBS is generally benign and asymptomatic in almost all cases, except immunocompromised patients in whom PUBS can be the first sign of Fournier's gangrene.<sup>8</sup> No official guidelines exist. Improving the care of urinary catheter and control of constipation are essential for the prevention of PUBS. The treatment of underlying UTI consists of antibiotics to prevent urosepsis, especially for patients with multiple comorbidities.<sup>1</sup> As our patient was an institutionalized female with severe CKD, alkaline urine, constipation, and a long-term catheter, she was at increased risk for complications. She was correctly treated with catheter replacement, hydration, and intravenous piperacillin tazobactam until the purple hue of urine turned normal with complete resolution of PUBS and amelioration of renal function over a period of seventeen days.

## References

1. Hadano Y, Shimizu T, Takada S, et al. An update on purple urine bag syndrome. *Int J Gen Med* 2012;5:707-10.
2. Kumar U, Singh A, Thami G, Agrawal N. Purple urine bag syndrome: A simple and rare spot diagnosis in Uroscopic rainbow. *Urol Case Rep* 2020;35:101533.
3. Khan F, Chaudhry MA, Qureshi N, Cowley B. Purple urine bag syndrome: an alarming hue? A brief review of the literature. *Int J Nephrol* 2011;2011:419213.
4. Arnold WN. King George III's urine and indigo blue. *Lancet* 1996;347:1811-3.
5. Barlow GB, Dickson JAS. Purple urine bags. *Lancet* 1978;311:220-1.
6. Su YJ, Yang HW. Risk factors of mortality in patients with purple urine bag syndrome. *J Drug Assess* 2019;8:21-4.
7. Kalsi DS, Ward J, Lee R, Handa A. Purple urine bag syndrome: a rare spot diagnosis. *Dis Markers* 2017;2017:9131872.
8. Tasi YM, Huang MS, Yang CJ, et al. Purple urine bag syndrome, not always a benign process. *Am J Emerg Med* 2009;27:895-7.