

Nephroquiz
(Section Editor: M. G. Zeier)

An elderly nursing home resident with unusual urine bag discoloration

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Keywords: purple urine bag syndrome; urinary catheter; urinary tract infection

Case

A bedridden 75-year-old male with a history of end-stage renal disease, diabetes mellitus, hypertension and stroke was transferred from a nursing home to hospital due to an unusual discoloration of his Foley catheter bag. He was on long-term catheterization for chronic urinary retention secondary to degenerative spine disease. Past medical history also included recurrent hospital admissions for chronic constipation and urinary tract infections (UTIs) over the past 2 years.

On physical examination, patient appeared non-toxic, afebrile with blood pressure reading of 176/87 mmHg. Capillary blood sugar was 8.3 mmol/L. Cardiovascular, respiratory and abdominal examination was unremarkable. His urinary tube and bag was noted to be discolored, with cloudy urine seen (Figure 1). Laboratory investigations revealed a white blood cell (WBC) count of $10\,330/\text{mm}^3$, Hemoglobin 9.1 g/dL and C-reactive protein 33 mg/L. Urinalysis showed pyuria of WBC $>2000/\text{UL}$ and microorganism 2+.

Question

What is your diagnosis?

Answer

Purple urine bag syndrome (PUBS).

Discussion

This patient was diagnosed to have PUBS. The urine culture yielded *Proteus vulgaris* with a colony count of more than 100 000 CFU/mL. The UTI, coupled with underlying predisposing factors such as chronic constipation and long-term catheterization, has resulted in this rare phenomenon. This is his first onset of PUBS although he had a recurrent history of

admissions for UTIs caused by bacteria such as *Klebsiella pneumoniae*, *Escherichia coli*, *Enterococcus* species and *Enterobacter* species in separate occasions. He was initiated on appropriate antibiotic treatment and the purplish discoloration resolved on the next day.

PUBS could be a rare manifestation of UTI and was first reported in 1978 [1]. Over the years, a number of bacteria have been reported to be associated with this syndrome, including *Providencia*, *Morganella*, *Proteus*, *Klebsiella*, *Citrobacter*, *Enterobacter* and *Enterococcus* species [2].



Fig. 1. Purplish discoloration of urine catheter and bag.

The pathophysiology is believed to be related to dietary tryptophan, which is converted to indole by normal intestinal flora. Indole is absorbed into the portal circulation and oxidized to indoxyl sulfate in the liver. Urinary bacteria (if present) produce enzyme called indoxyl sulfatase/phosphatase, which transforms urinary indoxyl sulfate into indigo (blue) and indirubin (red). The mixture of these two pigments and reaction with the synthetic materials of the catheter and urine bag results in purple discoloration. Interestingly, the urine itself is not discolored purple [3] (Figure 1). PUBS has been shown to be associated with the female gender, alkaline urine, high urinary bacterial load, constipation, debilitation and the use of urinary catheter [1–3]. Indoxyl sulfatase-producing bacteria are commonly urease-producing, thus leading to alkaline urine. Constipation causes slow intestinal motility which promotes bacterial overgrowth and more tryptophan metabolism and absorption. Other intestinal conditions like intestinal obstruction, intussusception and ileal diversions were also reported to precipitate the PUBS [2].

Although the alarming appearance of PUBS may often cause anxiety in patients and their caregivers, its clinical course is usually benign without any sequelae [2, 3]. Aggressive investigation and treatment is usually not necessary. Constipation control, urologic sanitation and improvement in urinary catheter care have been suggested to prevent this rare clinical condition.

Conflict of interest statement. None declared.

References

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Received for publication: 8.9.11; Accepted in revised form: 8.9.11