

Purple Urine Bag Syndrome in Urinary Tract Infection

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Abstract

Purple urine bag syndrome (PUBS) is an unusual manifestation of urinary tract infection, characterized by purple discoloration of urine. Due to its rarity, it can be challenging for some physicians to manage it properly. In addition, its striking appearance can cause concern to some patients. This condition usually occurs in the debilitated geriatric population with prolonged use of an indwelling urinary catheter. However, our case highlights the development of PUBS in a young adult with a relatively short period of urinary catheterization.

Keywords: Purple urine bag syndrome, urinary catheterization, urinary tract infection

INTRODUCTION

Purple urine bag syndrome (PUBS) is a rare condition that occurs secondary to bacterial urinary tract infection (UTI).^[1] The unique purple urine color is thought to be derived from the metabolism of tryptophan metabolite by certain bacteria in the urinary tract.^[2,3] It is often associated with advanced age, prolonged use of indwelling urinary catheters, immobility, and constipation.^[2] Despite being considered a relatively benign process, some cases of PUBS have been reported to cause sepsis, with an overall mortality rate of about 6.8% if not treated promptly.^[1] Here, we report a case of a 23-year-old man who presented with purple-colored urine during the course of hospitalization for lupus nephritis, which was evaluated and managed for PUBS successfully.

CASE REPORT

A 23-year-old man, who was on his 7th day of hospitalization due to overload syndrome and lupus nephritis, had purple discoloration of urine [Figure 1]. He denied any fever, painful urination, or suprapubic pain. There was no history of drug or herbs consumption that potentially could produce purple urine. He had an indwelling Foley's catheter for urine output monitoring since admission and received intravenous methylprednisolone and mycophenolic acid for lupus nephritis. His activity was largely restricted at bed during the last 10 days due to dyspnea and significant lower extremity edema. He also complained of constipation for the last 7 days.

His physical examination was unremarkable. The leukocyte count was 9.880/mm³ with neutrophil 81% and urinalysis revealed alkaline urine (pH 8,0), leukocyte + 3, erythrocyte + 1, protein + 3, and negative dipstick nitrite. Urinary sediment showed 15–20 white blood cells/high-power field and bacteria. Urine culture yielded *Enterococcus faecalis* with more than 10⁵ CFU/mL, which is sensitive to ampicillin, nitrofurantoin, and teicoplanin. We gave intravenous ampicillin 1 g every 6 h, laxative (lactulose syrup), and changed the patient's Foley's catheter. On day 2 of ampicillin administration, the urine rapidly turned into yellow color. We switched intravenous to oral ampicillin by day 3, and ampicillin was continued for a total duration of 5 days. The patient had an uneventful recovery and was discharged with no symptoms on the 12th day of hospitalization.

DISCUSSION

PUBS is a rare condition first described in 1978 and characterized by an abnormal purple discoloration of urine.^[1,3] The pathogenesis of PUBS involves a series of biochemical transformations of tryptophan metabolite, named indole, by bacteria in the urinary tract.^[2-4] Indole is produced by the colonic bacterial metabolism of

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Figure 1: Characteristic purple discoloration of the urinary catheter

tryptophan. It enters portal circulation and is rapidly conjugated in the liver into indoxyl sulfate.^[3] Indoxyl sulfate is a colorless compound and is normally excreted in the urine.^[4] In people with UTIs due to certain bacteria containing phosphatase and sulfatase enzymes, indoxyl sulfate is further metabolized into indoxyl. Indoxyl will be oxidized into indigo (blue pigment) and indirubin (red pigment) within an alkaline urine situation, which mix together and react with the plastic of the urine tube into purple color.^[5] Other rarer causes of purple urine in the absence of UTI include blue diaper syndrome (a hereditary disorder of tryptophan metabolism) and consumption of certain drugs or chemicals.^[6]

PUBS is most often reported in the geriatric population. Our patient is a young adult but had multiple risk factors of PUBS which may explain its occurrence at a young age. First, he had been used an indwelling Foley's catheter for 7 days, was relatively immobile, and was being treated with immunosuppressants, all of which put him at risk of developing UTI. Second, urine culture yielded a significant amount of *Enterococcus sp.*, one of the bacteria known to have phosphatase and sulfatase enzymes.^[5,7] Third, he had constipation, which increased the transit time of dietary tryptophan and consequently the production of indole by bacteria in the colon.^[4] Fourth, this patient's underlying disease of lupus nephritis reduced renal excretion of indole and thereby increased indole concentration. Finally, the alkaline urine condition in this patient facilitated the oxidation of indole into purple pigment.

The most common clinical presentation of PUBS is urine discoloration without symptoms of UTI, as in our patient.^[6] Lack of UTI symptoms, in this case, could also be caused by the use of anti-inflammatory drugs. Treatment of PUBS is usually straightforward with the change or removal of Foley's catheter, administration of appropriate antibiotics, and laxative if constipation is present.^[8] The causative organism of UTI in our patient was *E. faecalis*, which is intrinsically resistant to most cephalosporins and increasingly resistant to quinolones, both of which are among the most commonly used antibiotics for UTI.^[9-13] Therefore, it is recommended to follow a local antimicrobial susceptibility pattern in treating PUBS due to *E. faecalis* infection. With prompt management of UTI as its underlying cause, the prognosis of PUBS is generally favorable as in our case.

Our case highlights the importance to consider UTI as the cause of PUBS and perform relevant laboratory investigations, even when signs and symptoms of UTI are lacking. This case also showed the possibility of PUBS to occur in a young adult when multiple risk factors of PUBS exist. Proper management of UTI leads to rapid resolution of PUBS.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Research quality and ethics statement

The authors followed applicable EQUATOR Network (<http://www.equator-network.org/>) guidelines, notably the CARE guideline, during the conduct of this report.

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Conflicts of interest

There are no conflicts of interest.

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