Purple Urine Bag Syndrome
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ABSTRACT
Purple urine bag syndrome is a condition where urine turns to purple upon contact with the urinary catheter. The prevalence rate has been reported to be 9.8% in institutionalized patients with long term indwelling urinary catheter. However, its prevalence in the Philippines is unknown. This is the first reported case in the country. This is the case of a 63-year-old, female, diabetic who came in due to dyspnea and decreasing urine output. She was managed as a case of acute kidney injury secondary to complicated urinary tract infection, in uremia. Hemodialysis commenced with note of purplish discoloration of urine. Urine culture showed heavy growth of Escherichia coli and Proteus mirabilis. Urine discoloration ceased upon treatment with appropriate antibiotics. The uncommon purple discoloration of urine is a rare manifestation of urinary tract infection. Although relatively benign, clinicians should be aware of this syndrome to prevent requesting irrelevant and expensive diagnostic test.

Key words: Purple Urine Bag Syndrome, PUBS, urinary tract infection

INTRODUCTION
Purple Urine Bag Syndrome (PUBS) was first observed by Golding in 1857. Golding noted purplish discoloration of urine upon contact with Foley catheter tubing and urine bag.¹ The purple discoloration is due to tryptophan from food which is metabolized into indole by bacteria colonizing the large bowel. The indole is absorbed into the portal circulation and detoxification in the liver results in indoxyl sulphate as a by-product. In urine, indoxyl sulphate is converted by enzymes produced by bacteria resulting in indigo (blue), indirubin (red) pigment and mixture of both (purple) staining the urine in the presence of alkaline environment and bacteria which participate and react to the synthetic components of the urine bag.²³ There are several predisposing factors such as long term use of urinary catheter, bed bound states, dementia, diabetic nephropathy, chronic constipation, intestinal obstruction, alkaline urine, dehydration, azotemia, use of polyvinyl chloride Foley catheter and female gender.⁴⁻⁶

CASE REPORT
This is a case of a 63-year-old Filipino, female, known diabetic for 14 years, maintained on Metformin 500 mg three times a day with good compliance. Upon probing, the patient started feeling easy fatigability and generalized body weakness 3 months prior to admission. One week prior to admission, there was persistence of symptoms, now accompanied with
decreasing urine output, undocumented fever, dysuria, flank pain and anorexia. One day prior to admission, the patient noted that she had no urine output for the whole day. Persistence of the above symptoms now associated with difficulty of breathing prompted consultation. Patient denies any history of previous admissions.

At the emergency room, her vital signs were: blood pressure of 110/70 mm/Hg, pulse rate 110 beats per minute, respiratory rate of 30 cycles per minute, and afebrile. The patient was awake with pale palpebral conjunctiva, dry lips and buccal mucosa. She was tachypneic, with symmetrical chest expansion and clear breath sounds. Cardiac exam was essentially normal, except for tachycardia. Pulses were full and equal, no edema observed. Extremities were warm and skin was noticeably dry. The rest of the physical examination was unremarkable. Laboratory investigation revealed leukocytosis with neutrophilic predominance associated with normocytic normochromic anemia. Creatinine clearance was noted to be 3.1mL/min/1.73m² and a BUN to crea ratio of 10.6. An ABG of severe metabolic acidosis with respiratory alkalosis was noted. Urinalysis showed light amber in color, turbid with proteinuria of +2, leukocyte of +2, pyuria of 5/HPF and many bacteria.

Patient was managed as a case of acute kidney injury secondary to complicated urinary tract infection, in uremia. At the emergency room, Foley catheter was inserted to monitor the urine output accurately. Patient underwent emergency hemodialysis and intravenous Ciprofloxacin 200 mg IV every 12 hours daily to cover for urinary tract infection was started.

On the third hospital day of admission, patient’s urine output was noted to be purplish in color (Figure 1). Foley catheter was immediately replaced.

The following day, there was persistence of the purplish discoloration. Upon further examination, it was observed that the urine once outside the urine bag turned brownish (Figure 2). Samples were immediately sent for urine culture. Results showed mixed heavy growth of Escherichia coli and Proteus mirabilis of >100,000 orgs/mL. While waiting for the result of the urine culture, Ciprofloxacin was continued.

![Figure 1. Purple discoloration of urine bag.](image1)

![Figure 2. Dirty dark brown-colored urine in sterile urine container.](image2)

After intravenous hydration, replacement of urinary catheter and five days of IV antibiotic therapy, patient’s urine turned yellow and urinary symptoms were resolved (Figure 3). Repeat urinalysis showed: light amber in color, turbid with protein of +3 and pyuria of 152/HPF. And repeat urine culture was also done which revealed Candida non-albicans with significant growth.
DICUSSION

PUBS is characterized by purple discoloration of the urine due to the interaction of urine bacteria with the in-dwelling catheter and urine bag. As previously explained, this is secondary to metabolized tryptophan interacting with urine bacteria. The urine itself is not purple but more commonly dirty brown in color.

There are several bacterial species that have been associated with this syndrome, including *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Morganella morgani*, *Escherichia coli*, *Providencia species*, *Enterobacter species*, et cetera. According to studies, one important factor for the development of this syndrome is a higher bacterial load in the urine, usually observed in alkaline urine. There are risk factors for the development of this syndrome, one of which is chronic constipation which induce bacterial overgrowth and allow longer resorption time for tryptophan to be metabolized into indole. Furthermore, the interaction of bacteria in the urine with polyvinylchloride content of the urine bag as well as dehydration plays an important role in enhancing the purplish discoloration of the catheter and the urine bag.

At present, there is no specific recommended approach for diagnosing PUBS other than visual identification of the purple urine in the bag and tubing. Additional tests like urinalysis and urine culture will confirm the presence of urinary tract infection. As to the treatment, although it is considered a benign syndrome it is sometimes associated with higher incidence of morbidity and mortality compared to simple UTI alone. According to Lin et al, she proposed that treatment of underlying UTI with an antibiotic, such as Ciprofloxacin is helpful.

More importantly, the replacement of the urinary catheter upon visualization of the discolored urine did not resolve the purplish discoloration of the urine in the urine bag. Hence, the presence of urine discoloration upon initial visual inspection should prompt immediate antibiotic treatment to prevent further complications.

CONCLUSION

Purple Urine Bag Syndrome is a condition associated with urinary tract infection. However, care should be exercised because of its high morbidity and possible mortality if appropriate management is not immediately started. Awareness of this syndrome should be addressed among the clinicians and health care workers as to avoid unnecessary investigations and confusion. Furthermore, prevention of this syndrome may be done by reducing the duration of catheterization, improving urological sanitation and control of constipation by appropriate nutritional management.

Acknowledgement
None.

Funding
None.

Disclosure
None.
**Ethical Consideration**

All means have been exhausted to obtain the patient consent to no avail.

**About the Paper**

This paper was presented at the 39th annual Convention of the Philippine Society for Microbiology and Infectious Diseases, November 28-30, 2017 at the PICC. It has also been presented at the Urology Research at the East Avenue Medical Center last October 3, 2017.

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**REFERENCES**


