

Purple Urine Bag Syndrome: A Bizarre Spot Diagnosis in ICU

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ABSTRACT

Purple urine bag syndrome (PUBS) is a visually striking rare disease seen in association with urinary tract infection. It is most commonly seen in elderly ladies with chronic debilitating diseases having prolonged indwelling urinary catheters. In cases of recurrent urinary tract infection, bacteria responsible for producing enzymes sulfatase and phosphatase produce pigments like indigo and indirubin which turn urine color into purple. We hereby present a case report of this unique phenomenon in an 82 years old lady with etiology, pathogenesis, clinical associations, and prognosis.

Keywords: Purple, Urine, Infection, UTI, Prolonged indwelling urinary catheter

Introduction

Purple urine bag syndrome (PUBS) was first formally reported in 1978 (1). Purple urine bag syndrome is the result of UTI with specific bacteria that produce sulfatases and phosphatases which catalyze tryptophan metabolism leading to indigo and indirubin pigments which produce a purple color. This condition can be alarming and distressing for kins of patients. Unlike traditional UTIs, those associated with PUBS are more likely to be asymptomatic but on culture may show significantly higher bacterial loads (1–2 logs) than those without the syndrome (2). The later point is important, as it leads to greater levels of the necessary bacterial sulfatases and phosphatases necessary for PUBS. Purple urine bag syndrome is related to significant mortality and morbidity, with overall mortality rate around 6.8% (3). Prompt and timely identification of the condition may help in management and to overcome the situation.

Here we present a case of an 82 years old lady with bed bound status for one year presenting with PUBS and sepsis with a fatal outcome.

Case

An 82 years old woman who was a known case of Type 2 diabetes mellitus and hypertension

with right middle cerebral artery (MCA) territory stroke and left hemiparesis for 1 year was bed bound and on domiciliary care. She was on Foley's catheter for 12 months with regular change of catheter. The last catheter change was done 4 weeks ago. She was brought by relatives with complaints of a purple-colored change in color of urine bag for 2 days duration (Figure 1) followed by fever, breathlessness, and altered sensorium of one day duration. On examination, she had fever with tachycardia, hypotension, tachypnoea, hypoglycemia (random blood sugar 27 mg/dl), low GCS of E1V1M3, postural flexion contractures in all limbs with grade 3 bedsore in the sacral area. Her evaluation revealed neutrophilic leukocytosis, azotemia, hypoalbuminemia, and transaminitis. Her urine culture had grown *Escherichia coli* sensitive to Meropenem, Imipenem, Gentamicin and Amikacin and pus swab culture from bedsore had *Pseudomonas aeruginosa*. A provisional diagnosis of PUBS with sepsis was made and she was placed on mechanical ventilation and broad-spectrum antibiotics were started with inotrope infusion. Antibiotics were modified as per the sensitivity pattern. However, she continued to deteriorate with renal function deterioration and increasing inotrope requirement and inspite of all aggressive measures she succumbed to her illness on day 5 of hospital admission.



Figure 1. Purple urine in tubing and urine bag of patient

Discussion

Historically PUBS dates to 1812 when physicians noticed the blue color of urine in King George III during a bout of chronic constipation (4); however, it was first formally reported in 1978 (1). It is usually uncommon, but the prevalence in patients with long-term indwelling urinary catheter use has been reported to be from 8% to 40% (5).

Purple urine bag syndrome is a rare bedside spot diagnosis. It is commonly seen in elderly females with debilitating disease conditions like cancer, stroke, dementia etc with a history of long-standing indwelling urinary catheter with or without constipation (6,7). The major risk factors implicating in the development of PUBS are female gender, increased dietary tryptophan content, increased urine alkalinity, severe constipation, chronic indwelling urinary catheter, high urinary bacterial load, and renal failure.

It is caused by recurrent UTI by certain gram-negative bacteria that metabolize tryptophan by various mechanisms and finally lead to red and blue pigments that combine with the polyvinyl chloride (PVC) material of the urine bag to yield purple color. *Providencia stuartii* and *Providencia rettgeri*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Escherichia coli*, *Morganella*, and *Citrobacter* species, Enterococci, and Group B Streptococci are commonly cultured from the urine of individual having PUBS (8, 9). The normal flora in the intestine metabolizes tryptophan into indole via bacterial action. Then indole enters portal circulation via the gut wall. Indole is converted into indoxyl sulfate by the mechanism of conjugation in the liver. Indoxyl sulfate is excreted in the urine where urinary bacteria produce sulfatases and phosphatases which convert indoxyl sulfate to indoxyl which then produces Indirubin (red) and Indigo (blue) pigments by oxidation. The purple color in the urine catheter and bag is produced by the combination of both these pigments which is facilitated by PVC material.

It is often misdiagnosed as porphyria, ingestion of certain berries, fava beans, beet roots, food dyes, or drug reactions like indomethacin and flutamide which can be its differential diagnosis (7). Treatment can be directed at treating underlying UTI, catheter care, proper sanitation, and treatment of constipation if any. Antibiotic choice should be governed by an organism isolated along with the sensitivity pattern. Purple urine bag syndrome is generally a benign condition and does not have any prognostic implications. However it still holds higher mortality than simple UTI and can lead to significant complications like Fourniere's gangrene, valvular abscess, and sepsis with MODS (10).

Conclusion

Purple urine bag syndrome is a bizarre bedside spot diagnosis which physicians in the intensive care units should be aware of. It can be distressing and alarming for families. Though it is a benign disorder and can be easily treated with catheter care and antibiotics but it may sometimes lead to certain complications and increase associated mortality.

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Concept: SD; Design: SD and NK; Supervision: NK; Resources: SD; Literature Search: SD; Writing Manuscript: SD; Critical Review: NK

Informed Consent: Written informed consent taken from patient's son

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References

1. Barlow GB, Dickson JA. Purple urine bags. *The Lancet*. 1978;311(8057):220–1. [\[CrossRef\]](#)
2. Lin CH, Huang HT, Chien CC, Tzeng DS, Lung FW. Purple urine bag syndrome in nursing homes: ten elderly case reports and a literature review. *Clin Interv Aging*. 2008;3(4):729–34. [\[CrossRef\]](#)
3. Yang HW, Su YJ. Trends in the epidemiology of purple urine bag syndrome: A systematic review. *Biomed Rep*. 2018;8(3):249–56. [\[CrossRef\]](#)
4. Arnold WN. King George III's urine and indigo blue. *Lancet*. 1996;347(9018):1811–3. [\[CrossRef\]](#)
5. Kumar D, Donga N, Macwan R. Purple Urine Bag Syndrome: A Scary but Easily Manageable Condition in a Patient with Prolonged indwelling Urinary Catheter. *Indian J Palliat Care*. 2018;24(4):534–6. [\[CrossRef\]](#)
6. Traynor BP, Pomeroy E, Niall D. Purple urine bag syndrome: a case report and review of the literature. *Oxf Med Case Reports*. 2017;2017(11):omx059. [\[CrossRef\]](#)
7. Agapakis D, Massa E, Hantzis I, Paschoni E, Satsoglou E. Purple Urine Bag Syndrome: a case report of an alarming phenomenon. *Hippokratia*. 2014;18(1):92–4.
8. Ong CY, Vasanwala FF. Gentleman with the Purple Urine. *Korean J Fam Med*. 2020;41(2):133–5. [\[CrossRef\]](#)
9. Ollapallil J, Irukulla S, Gunawardena I. Purple urine bag syndrome. *ANZ J Surg*. 2002;72(4):309–10. [\[CrossRef\]](#)
10. Tasi YM, Huang MS, Yang CJ, Yeh SM, Liu CC. Purple urine bag syndrome, not always a benign process. *Am J Emerg Med*. 2009;27(7):895–7. [\[CrossRef\]](#)