



CASE REPORT

An Unusual Urine Discolouration Caused by a Common Infection: A Case Report on Purple Urine Bag Syndrome in an Elderly Patient

Ferdinand Wiliam Jaya,¹ I Gede Putu Adhi Wedharga,¹ Yudita Wulandari²

Abstract

Purple urine bag syndrome (PUBS) represents an uncommon but generally harmless phenomenon, marked by a striking violet discolouration of the urinary collection bag. It is most frequently observed in chronically ill individuals with long-term catheterisation and is often linked to urinary tract infections (UTIs). The case of a 74-year-old female with multiple comorbidities is described who presented with suprapubic discomfort and discoloured urine. Laboratory evaluation confirmed a UTI and management with intravenous ceftriaxone, administration of lactulose and replacement of the urinary catheter resulted in rapid clinical improvement. This report underscores the importance of recognising PUBS as a visual clue to underlying infection in older patients and highlights the need for prompt intervention to avoid further complications.

Key words: Purple urine bag syndrome; Urinary tract infections; Catheters, indwelling; Aged patient; Urine, colour change.

1. Faculty of Medicine, Widya Mandala Surabaya Catholic University, Kalisari, Mulyorejo, Surabaya, East Java, Indonesia.
2. Department of Internal Medicine, Gotong Royong Hospital Surabaya, Medokan Semampir, Sukolilo, Surabaya, East Java, Indonesia.

Citation:

Jaya FW, Wedharga IGPA, Wulandari Y. An unusual urine discolouration caused by a common infection: a case report on purple urine bag syndrome in an elderly patient. Scr Med. 2026 Jul-Aug;57(4):957-61.

Corresponding author:

Ferdinand Wiliam Jaya
E: ferdinand.meds@gmail.com
T: +62 8128 414 0620

Received: 8 November 2025
Revision received: 23 November 2025
Accepted: 23 November 2025

Introduction

Purple urine bag syndrome (PUBS) is an uncommon but generally benign clinical phenomenon, recognised by the striking violet discolouration of urine collection bags in patients with urinary tract infection (UTI).¹ It is most frequently observed among elderly individuals, particularly those with prolonged catheterisation, reduced mobility, or chronic constipation.² The discolouration is linked to colonisation by Gram-negative organisms, which may cause either symptomatic or asymptomatic UTIs.³ These bacteria produce the enzymes indoxyl sulfatase and phosphatase, which convert tryptophan metabolites into indigo (blue) and indirubin (red) pigments. When these pigments mix, they generate the characteristic purple hue.³⁻⁵ The relative balance

of the pigments can result in a spectrum of colours, from bluish to reddish tones. Notably, the pigments preferentially adhere to synthetic catheter tubing and collection bags, rather than altering the appearance of freshly voided urine.³

Case history

A 74-year-old female, with a prior history of post-operative left humeral fracture and impaired mobility, presented to the Emergency Department of Gotong Royong Hospital, Surabaya, East Java, Indonesia, after two months of indwelling urinary

catheterisation. Her family reported progressive changes in the urine colour within the catheter bag, shifting from yellow to reddish and eventually to a distinct purple hue (Figure 1). Past medical history included hypertension, chronic kidney disease (CKD), cerebrovascular accident (CVA) and anaemia. In addition, relatives noted a onemonth history of constipation and reduced appetite during the preceding week.

On examination, the only notable clinical finding was suprapubic tenderness, with no other remarkable signs. Laboratory studies demonstrated leukocytopenia ($2.8 \times 10^3/\mu\text{L}$) with neutrophils at 43.7 %, alkaline urine (pH 7.5), leukocyte +3, erythrocyte +1 and motile rodshaped bacteria, consistent with urinary tract infection. Haematology revealed haemoglobin of 9.2 g/dL, erythrocyte count of $2.8 \times 10^6/\mu\text{L}$, haematocrit of 26.7 %, MCV of 95.4 fL and MCH of 32.9 pg, indicating normochromic normocytic anaemia. The Mentzer index count resulted 34.1 which indicative for iron deficiency anaemia.

Renal function tests showed blood urea nitrogen (BUN) of 36.9 mg/dL, serum creatinine of 1.61 mg/dL and blood urea of 79 mg/dL, with an estimated glomerular filtration rate (eGFR) of 33 mL/min/1.73 m² (calculated using the 2021 CKDEPI formula). An abdominal ultrasound performed

two months earlier revealed structural kidney changes, which, together with current laboratory findings, classified her CKD as stage IIIb according to KDIGO 2024 guidelines. The combination of alkaline urine, bacterial colonisation and catheterrelated discolouration was consistent with PUBS, a rare but recognised occurrence in longterm catheterised patients.

In the emergency unit, she received an initial intravenous dose of ceftriaxone (1 g) and the urinary catheter was replaced. During hospitalisation, ceftriaxone was continued at 1 g intravenously three times daily, along with lactulose syrup and essential ketoacids. Remarkably, the urine colour returned to yellow within 24 hours, indicating rapid resolution. The patient recovered without complications and was discharged symptomfree on the third day.

Discussion

UTI can occur across all age groups; however, their unusual presentation as PUBS is most frequently encountered in elderly women with prolonged catheterisation.⁶ This phenomenon was initially described by Barlow and Dickson in 1978, who noted purplish urine discolouration in children with spina bifida and urinary diversions—conditions often complicated by constipation or bowel obstruction.⁷ PUBS has since been linked to alkaline urine and several comorbidities, with chronic kidney disease, type 2 diabetes mellitus and hypertension being the most commonly reported associations.⁸ Although the striking discolouration may appear alarming, PUBS is generally regarded as a benign condition.

The distinctive discolouration in PUBS can be explained by its unique pathophysiological mechanism, which involves dietary factors, bacterial metabolism and host physiological conditions. The pathogenesis of PUBS is summarised in Figure 2. Tryptophan as an essential amino acid must be consumed from protein-rich foods, such as meat, eggs, dairy products, grains and legumes.⁹ Tryptophan is an amino acid with indole nucleus, thus its metabolism (deamination) in intestine by gut microbiota via tryptophanase produce indole as an active metabolite.³ Indole then transported hematogenously to liver which undergo conjugation, resulted in production of indoxyl sulphate (indican). Indoxyl sulphate is

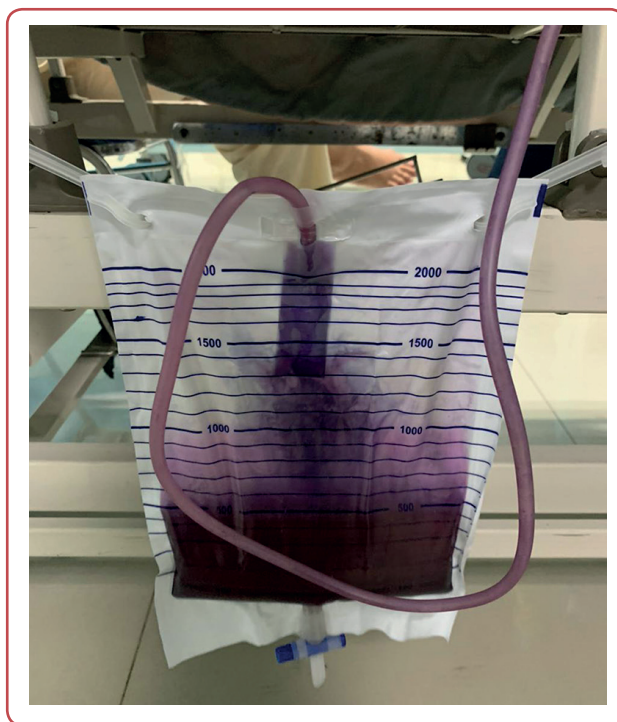


Figure 1: Urine bag showing characteristic purple discolouration in a patient with purple urine bag syndrome (PUBS)

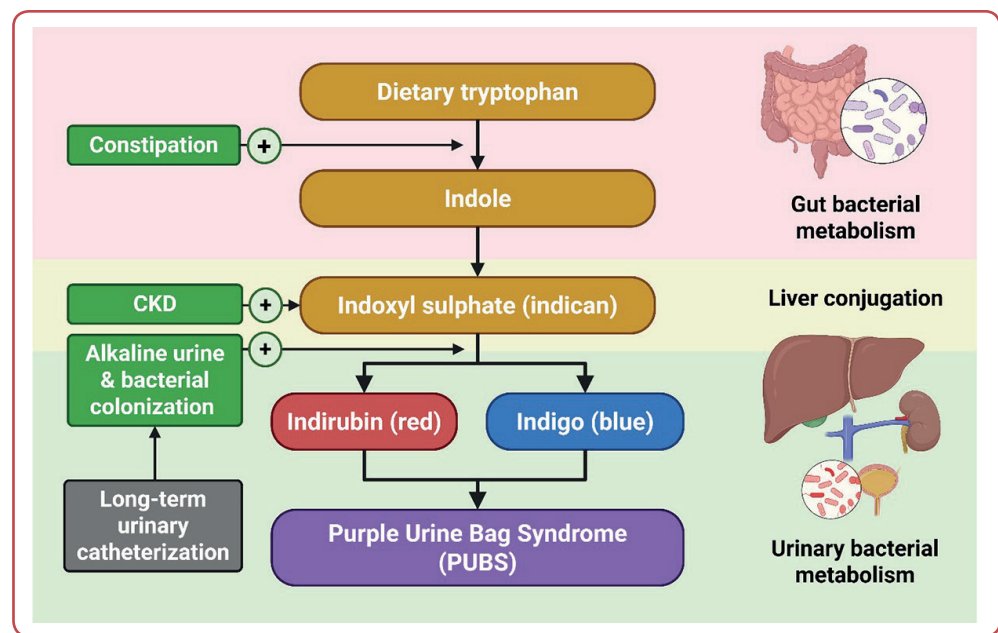


Figure 2: Metabolism pathway involved in purple urine bag syndrome (PUBS) and its modification by certain disease

CKD: chronic kidney disease;

hydrophilic, thus is secreted into the urine by the kidney. Certain Gram-negative bacteria, most frequently *E coli*, *Enterococcus spp* and *Proteus spp*, in the urinary tract produce sulphatase and phosphatase which could convert indoxyl sulphate into indigo (blue) and indirubin pigment (red).^{10, 11} When combined, these pigments produce the characteristic purple hue. Importantly, the pigments adhere to synthetic materials such as polyvinyl chloride (PVC) catheter tubing and collection bags, rather than altering the colour of freshly voided urine.³

In the present case, constipation may have contributed to PUBS pathogenesis through intestinal bacterial overgrowth. Although the dietary tryptophan is not excessive, increased intestinal bacterial counts contribute to the increase of tryptophan deamination to produce indole. Regarding bed-ridden elderly, long immobilisation may induce a reduction in intestinal motility, thus worsen the constipation.¹² Furthermore, reduced renal clearance as seen in CKD, prevent indoxyl sulphate excretion, thus increasing its systemic and urinary concentrations. In conjunction, alkaline urine and bacterial colonisation, particularly which produces sulphatase and phosphatase, favour indoxyl sulphate conversion into indigo and indirubin pigments. These alkaline urine and bacterial colonisation were mainly caused by urinary stasis as frequently demonstrated in indwelling urinary catheter usage. Although we cannot confirm what exact bacteria is causing

the UTI, we could demonstrate that motile rod-shaped bacteria were present in the urine sediment and the urinalysis revealed leukocyturia and alkaline pH, both consistent with colonisation by organisms commonly implicated in PUBS, such as *E coli*, given its prevalence in catheter-associated UTIs.¹³

Since PUBS is primarily driven by bacterial metabolism, intestinal dysbiosis and urinary stasis, treatment should address these underlying contributors. In this patient, ceftriaxone was administered intravenously to empirically eradicate suspected bacteria that cause UTI. In addition, lactulose syrup was administered to relieve the constipation, thus preventing further intestinal bacterial overgrowth and limiting indole production. Regarding the patient's known CKD, essential ketoacid supplementation was continued to prevent renal deterioration by minimising nitrogenous waste. Lastly, the indwelling urinary catheter was replaced to disrupt current bacterial colonisation and biofilm formation, which contribute to alkaline urine. Although 14-days replacement is recommended by the Indonesian Urological Association (2021) for short-term indwelling urinary catheter, recent evidence showed that ≥ 5 days catheterisation had a significant risk factor for biofilm formation.^{14, 15} Weekly catheter replacement is recommended for this patient, considering the patient's susceptibility to infection and cost-effectiveness principle.

Conclusion

PUBS is a rare manifestation of an underlying UTI, most commonly observed in patients with long-term catheterisation and those who are bedridden. This case report aims to raise awareness among physicians that PUBS should be recognised and managed as a urinary tract infection. A notable aspect of this case was the presence of multiple risk factors, including advanced age, female gender, CKD, a history of hypertension and CVA, as well as anaemia. Appropriate antibiotic therapy and urinary catheter replacement can effectively treat the infection and result in complete resolution of the urine discolouration.

Ethics

Ethical approval was not required by our institution for the publication of individual case reports. Informed consent was secured from the patient's legal guardian, permitting the inclusion of anonymised clinical details in this publication.

Acknowledgement

Some portions of this manuscript including the abstract and discussion were developed and refined with assistance from Microsoft Copilot, an AI-based writing companion. Queries were submitted on multiple dates in October 2025, including requests to paraphrase discussion section and paraphrase the abstract become shorter. All content generated with AI assistance was thoroughly evaluated, refined and approved by the authors to ensure medical accuracy, contextual appropriateness and adherence to ethical and publishing standards.

Conflicts of interest

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data access

The data that support the findings of this study are available from the corresponding author upon reasonable individual request.

Author ORCID numbers

Ferdinand Wiliam Jaya (FWJ):
0009-0006-2853-8752
I Gede Putu Adhi Wedharga (IGPAW):
0009-0007-8055-3260
Yudita Wulandari (YW):
0009-0005-9955-7558

Author contributions

Conceptualisation: FWJ
Investigation: FWJ, IGPAW, YW
Data curation: FWJ
Writing - original draft: FWJ, IGPAW
Writing - review and editing: FWJ
Visualisation: IGPAW
Supervision: YW
Project administration: YW

References

1. Mohib O, Roland T, Fontaine M, Laurent F, Rossi C. Purple urine bag syndrome is a rare manifestation of bacteriuria on bladder catheter: case report. *African J Urol.* 2021 Dec 24;27(1):81. doi: 10.1186/s12301-021-00191-5.
2. Jappi Y, Hadi U. Purple urine bag syndrome in urinary tract infection. *J Glob Infect Dis.* 2023 Mar 31;15(2):84-85. doi: 10.4103/jgid.jgid_144_22.
3. Popović MB, Medić DD, Velicki RS, Jovanović Galović AI. Purple urine bag syndrome in a home-dwelling elderly female with lumbar compression fracture: a case report. *Healthcare (Basel).* 2023 Aug 10;11(16):2251. doi: 10.3390/healthcare11162251.

4. Kumar R, Devi K, Kataria D, Kumar J, Ahmad I. Purple urine bag syndrome: an unusual presentation of urinary tract infection. *Cureus*. 2021 Jul 11;13(7):e16319. doi: 10.7759/cureus.16319.
5. Mahdi F, Larijani A. Purple urine bag syndrome: a unique clinical case and management considerations. *BMC Nephrol*. 2024 Oct 24;25(1):375. doi: 10.1186/s12882-024-03708-6.
6. Yaqub S, Mohkum S, Mukhtar KN. Purple urine bag syndrome: A case report and review of literature. *Indian J Nephrol*. 2013 Mar;23(2):140-2. doi: 10.4103/0971-4065.109442.
7. Barlow GB, Dickson JAS. purple urine bags. *Lancet*. 1978 Jan;311(8057):220-1. doi: 10.1016/S0140-6736(78)90667-0.
8. Jindal J, Garg V, Gupta V. Urinary tract infections and purple urine bag syndrome- A neglected entity. *J Lab Physicians*. 2024 Nov 30;16:556. doi: 10.25259/JLP_128_2024.
9. Khusun H, Monsivais P, Anggraini R, Februhartanty J, Mognard E, Alem Y, et al. Diversity of protein food sources, protein adequacy and amino acid profiles in Indonesia diets: Socio-Cultural Research in Protein Transition (SCRiPT). *J Nutr Sci*. 2022 Sep 28;11:e84. doi: 10.1017/jns.2022.82.
10. Yang HW, Su YJ. Trends in the epidemiology of purple urine bag syndrome: A systematic review. *Biomed Rep*. 2018 Mar;8(3):249-256. doi: 10.3892/br.2018.1046.
11. Toyyibah I, Fajariya R, Keswardiono CB, Queiroz LTC, Wibowo TDP. Purple urine bag syndrome: a rare manifestation of urinary tract infection. *Indon J Tropical Infectious Dis*. 2024 Mar 6;12(1). doi: 10.20473/ijtid.v12i1.42151.
12. Sabanis N, Paschou E, Papanikolaou P, Zagkotsis G. Purple urine bag syndrome: more than eyes can see. *Curr Urol*. 2019 Nov;13(3):125-32. doi: 10.1159/000499281.
13. Klein RD, Hultgren SJ. Urinary tract infections: microbial pathogenesis, host-pathogen interactions and new treatment strategies. *Nat Rev Microbiol*. 2020 Apr;18(4):211-226. doi: 10.1038/s41579-020-0324-0.
14. Hamid ARA, Rasyid N, Daryanto B. [Guidelines for catheter, cystostomy, and nephrostomy care]. 1st ed. Ikatan Ahli Urologi Indonesia (IAUI); 2021. Indonesian.
15. Gunardi WD, Karuniawati A, Umbas R, Bardosono S, Lydia A, Soebandrio A, et al. Biofilm-producing bacteria and risk factors (gender and duration of catheterization) characterized as catheter-associated biofilm formation. *Int J Microbiol*. 2021 Feb 22;2021:8869275. doi: 10.1155/2021/8869275.