Cureus
Part of SPRINGER NATURE

Open Access Case Report

Purple Haze as a Tell-Tale Sign: A Case Report

Fady Michael [1], Nathan R. Attalla [2], Timmer Verhaegh [3], Atefeh Kalantary [4], Aram A. Namavar [4]

1. Medicine, Western University of Health Sciences, Pomona, USA 2. Medical School, University of California, Irvine, Irvine, USA 3. Medicine, David Geffen School of Medicine at UCLA, Los Angeles, USA 4. Medicine, UCLA Health, Los Angeles, USA

Corresponding author: Fady Michael, fady.michael@westernu.edu

Review began 08/05/2026
Review ended 10/03/2026
Published 10/18/2026

© **Copyright** 2026
Michael et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.118128

Abstract

Patients with urinary tract infection (UTI) symptoms report dysuria, urinary frequency, fever, and/or urinary urgency. In addition, those with catheter-associated UTIs may have flank pain or suprapubic or costovertebral tenderness. We present a case of a rare physical examination finding that can also aid in the diagnosis of a catheter-associated UTI: purple urine bag syndrome (PUBS). An 84-year-old man with a past medical history of metastatic prostate cancer complicated by a rectourethral fistula, status post ileal conduit and loop colostomy, presented after his daughter noticed what she believed was blood in the overnight drainage bag connected to his ileal conduit. The patient had previously required bilateral percutaneous nephrostomy tubes for malignant extrinsic ureteral compression from progressive prostate cancer, but the right nephrostomy tube had subsequently been removed after identifying that the left-sided obstruction was the culprit. The patient was reporting right-sided abdominal pain and fatigue. On examination, the patient was lethargic and unable to provide a history. Examination revealed dark purple discoloration of the ileal conduit tubing and overnight drainage bag. A Foley catheter placed by the emergency department did not drain urine because of the patient's ileal conduit and was subsequently removed. Urinalysis did not demonstrate hematuria, indicating that the discoloration perceived as blood was the purple hue shown in the clinical photograph. Urine specimens were obtained from the functioning urinary drainage sites, and the culture obtained from the ileal conduit collection bag was positive. The patient was started on ertapenem and daptomycin due to a history of severe sepsis secondary to vancomycin-resistant *Enterococcus* (VRE) UTI from his ileal conduit and extended-spectrum beta-lactamase-producing (ESBL) *Escherichia coli* from his catheter site. CT of the abdomen and pelvis demonstrated hydronephrosis of the right kidney with concern for developing pyelonephritis. The right-sided hydronephrosis was attributed to malignant extrinsic ureteral compression from progressive prostate cancer. The urine culture from the ileal conduit collection bag grew *Providencia stuartii*, *Proteus mirabilis*, *E. coli*, and *Pseudomonas aeruginosa*, all of which were susceptible to meropenem. Due to concern for pyelonephritis and a rise in the patient's creatinine, a right-sided percutaneous nephrostomy (PCN) tube was placed, and the patient's condition improved after a six-day course of meropenem. This case is notable for purple discoloration of the ileal conduit tubing and overnight collection bag, consistent with PUBS. This syndrome is associated with UTIs in elderly people, particularly those who are constipated. The source of the pigment has been attributed to altered tryptophan metabolism related to prolonged intestinal transit time and the production of indole derivatives by bacteria. The tryptophan metabolites produce red and blue pigments that combine to form the purple color seen in PUBS. In this patient, the culture obtained from the ileal conduit collection bag grew predominantly *Providencia stuartii* and *Proteus mirabilis*, both of which have been implicated in this syndrome. The patient's right-sided hydronephrosis occurred in the setting of malignant extrinsic ureteral compression from progressive prostate cancer rather than obstruction of the bladder or urethra.

Categories: Internal Medicine, Nephrology, Infectious Disease
Keywords: catheter-associated uti, hydronephrosis, illeal conduit, indoxyl sulfate metabolism, providencia stuartii, purple urine bag, urinary obstruction, urinary tract infection

Introduction

Urinary discoloration is often due to a change in urochrome concentrations in combination with the presence of other pigments. A spectrum of colors has been seen in the urine bags of patients and can offer vital clinical insights, pointing toward potential infections, medications, poisons, or hemolysis [1]. One particular example is purple urine bag syndrome (PUBS). First reported in 1978, PUBS is a rare but typically harmless condition characterized by a vivid purple discoloration of both the urine and the collection bag. While visually alarming, it is often more of a diagnostic curiosity than a clinical emergency [2]. It is often seen in older adults who are bedridden and have predisposing factors, such as female sex, advanced age, constipation, long-term catheterization, dementia, and chronic kidney disease [3]. While people with PUBS do not typically report symptoms, it has been found to be a sign of a catheter-associated urinary tract infection (UTI), which can cause flank pain or suprapubic or costovertebral tenderness. Bacteria capable of producing these enzymes include *Providencia* spp., *Klebsiella*, and *Proteus* [4]. Following gastrointestinal absorption, indole undergoes hepatic conjugation in the liver to form indoxyl sulfate (indican), which is subsequently excreted into the urinary tract. Within the urine, bacterial sulfatases and phosphatases cleave indoxyl sulfate into indoxyl. In an alkaline urinary environment, indoxyl oxidizes into two distinct pigments, indigo (blue) and indirubin (red), which combine to produce the purple discoloration in the urine

collection bag [4].

This abstract was previously presented as a poster at the 2020 American College of Physicians (ACP) Internal Medicine Meeting on April 23, 2020.

Case Presentation

An 84-year-old man with a history of metastatic prostate cancer complicated by a rectourethral fistula, previously managed with an ileal conduit and loop colostomy, presented after his daughter noticed what she believed was blood in the overnight drainage bag connected to his ileal conduit (Figure *1*). He had previously required bilateral percutaneous nephrostomy tubes for ureteral obstruction caused by malignant extrinsic compression from progressive prostate cancer. The right nephrostomy tube had subsequently been removed after the left-sided obstruction was identified as the true culprit. Collateral history was provided by his daughter because the patient was lethargic and unable to provide a history during the evaluation. She reported that he had experienced right-sided abdominal pain and fatigue before the change in his mental status.



FIGURE 1: Purple hue in the urine bag

Further examination revealed indigo-purple staining of the ileal conduit tubing and its connected overnight drainage bag (Figure *2*; image used with permission of Mayo Foundation for Medical Education and Research [5]). A Foley catheter was placed by the emergency department during the initial evaluation. However, the catheter did not drain urine because the patient's urinary stream had been diverted through the ileal

conduit, and the Foley was subsequently removed. Urine sampling was performed from the functioning urinary drainage sites. Urinalysis did not demonstrate hematuria, confirming that the discoloration perceived by the patient's daughter as blood represented the purple hue shown in Figure 2.

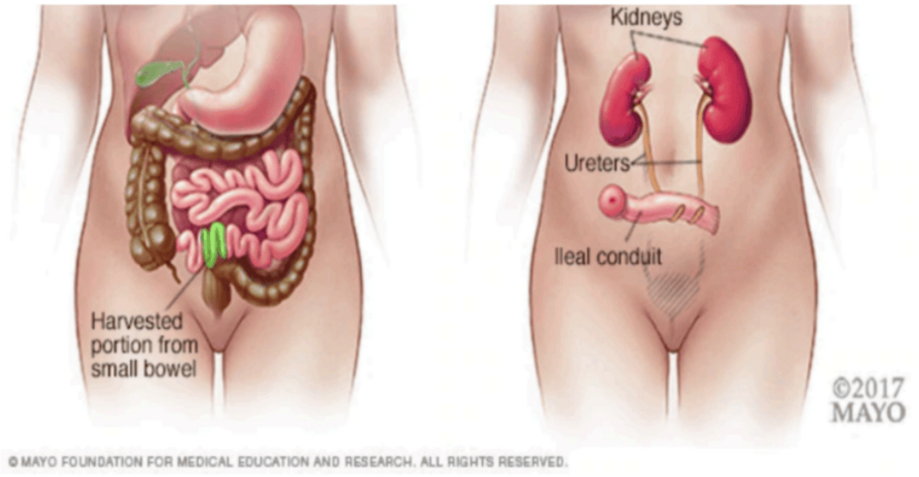


FIGURE 2: Ileal conduit procedure

Used with permission of Mayo Foundation for Medical Education and Research, all rights reserved [5]

The patient was immediately started on ertapenem and daptomycin due to a history of severe sepsis from vancomycin-resistant *Enterococcus* (VRE) UTI from his ileal conduit and extended-spectrum beta-lactamase-producing (ESBL) *E. coli* from his catheter site. The urine culture obtained from the ileal conduit collection bag grew >1.0 x 105 CFU/mL *Providencia stuartii*, > 1.0 x 105 CFU/mL *Proteus mirabilis*, <2.5 x 104 CFU/mL *E. coli*, and <7.5 x 104 CFU/mL *Pseudomonas aeruginosa*. These laboratory results are presented in Table 1.

Bacterial species	Bacteria pathogenicity	Colony threshold (man)	Lab value	Clinical significance
Escherichia coli	Primary	10^3 CFU/mL	<2.5 x 10^4 CFU/mL	Clinically significant bacteriuria consistent with UTI
Providencia stuartii	Secondary	10^3 CFU/mL	>10^5 CFU/mL	Clinically significant bacteriuria consistent with UTI
Proteus mirabilis	Secondary	10^3 CFU/mL	<2.5 x 10^4 CFU/mL	Clinically significant bacteriuria consistent with UTI
Pseudomonas aeruginosa	Secondary	10^3 CFU/mL	<7.5 x 10^4 CFU/mL	Clinically significant bacteriuria consistent with UTI

TABLE 1: CFU (colony-forming units) per milliliter indicates viable bacterial count in urine.

Clinical significance is determined using diagnostic thresholds for significant bacteriuria as described by Kurotschka et al. (2024), referenced in the American Family Physician.

Laboratory results also showed an acute rise in the patient's baseline creatinine, prompting CT imaging of the abdomen and pelvis. The scan demonstrated right-sided hydronephrosis with concern for developing pyelonephritis. The hydronephrosis was attributed to recurrent malignant extrinsic ureteral compression from progressive prostate cancer. Treatment consisted of placement of a right PCN tube and a six-day course of meropenem, after which the patient's clinical condition improved.

Discussion

This is an uncommon case involving purple discoloration of the overnight collection bag, consistent with PUBS (Figure 3). It occurs in approximately 9.8% of institutionalized patients with long-term indwelling

urinary catheters and is associated with elderly age (mean age of 78), female sex (70.7%), long-term catheterization (45.1%), constipation (90.1%), alkaline urine (91.3%), being bedridden (76.1%), dementia (42.8%), recurrent UTIs (14.3%), and a high intake of dietary tryptophan [6]. PUBS is essentially a spot diagnosis [7]. Although discolored urine can be associated with approximately 75 different conditions, the appearance of purple urine has a differential limited to PUBS alone [8]. Because of this distinctive presentation, the finding should prompt immediate evaluation for an underlying UTI, allowing clinicians to recognize and address the infection without delay. The purple color is caused by tryptophan metabolism related to prolonged transit times in the gut and the production of indole derivatives by bacteria, such as *Providencia* spp., *Klebsiella*, and *Proteus* [4]. The tryptophan metabolites produce red and blue pigments that combine to form the purple color seen in PUBS. In this patient, the culture obtained from the ileal conduit collection bag grew predominantly *Providencia stuartii* and *Proteus mirabilis*, both of which have been implicated in this syndrome. Urinalysis did not show hematuria, supporting that the apparent blood reported by the patient's daughter was the characteristic purple discoloration rather than gross urinary bleeding.

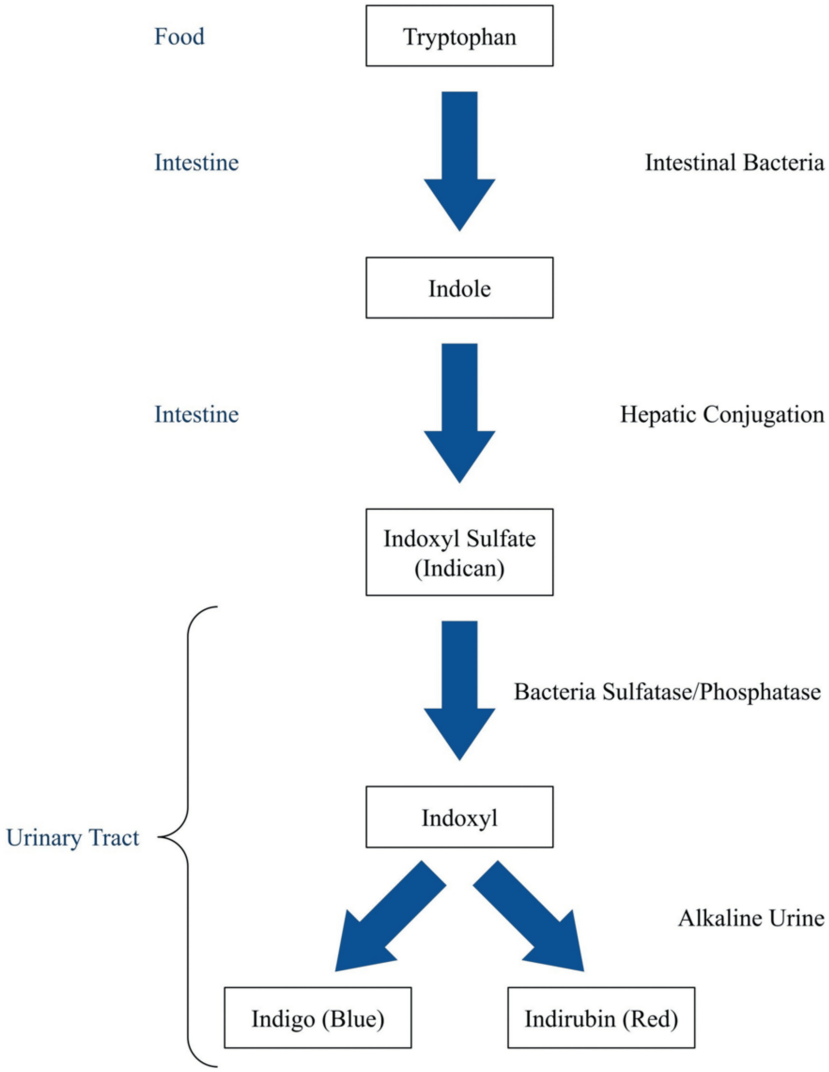


FIGURE 3: Pathophysiology of purple urine bag syndrome (PUBS)

Metabolic pathway of dietary tryptophan to indole, hepatic conversion to indoxyl sulfate, and bacterial transformation into indigo and indirubin pigments.

Figure created by the authors using Google Drawings (Google Workspace, Google, USA), adapted from Arivalagan et al. (2025) [4]

The culture obtained from the ileal conduit collection bag grew >100,000 CFU/mL *Providencia stuartii*,

>100,000 CFU/mL *Proteus mirabilis*, <25,000 CFU/mL *E. coli*, and <75,000 CFU/mL *Pseudomonas aeruginosa*, all of which were susceptible to meropenem. *Proteus mirabilis*, *Providencia stuartii*, and *Pseudomonas aeruginosa* are commonly linked to catheter-associated, nosocomial, polymicrobial, and complicated UTIs, all criteria fitting an opportunistic, secondary infection rather than a primary infection [9], while *E. coli* is considered a primary pathogen [10]. The commonly accepted thresholds for defining a positive urine culture result require a colony threshold of 10^3 CFU/mL for primary pathogens, while secondary pathogens require 10^4 CFU/mL for women and 10^3 CFU/mL for men [10].

What makes this case notable is the occurrence of PUBS in a patient with an ileal conduit and a concurrent obstructive process involving the upper urinary tract. CT imaging of the abdomen and pelvis demonstrated hydronephrosis of the right kidney with concern for developing pyelonephritis. Unlike a patient with intact ureterovesical anatomy, obstruction at the level of the bladder or urethra would not explain this patient's upstream hydronephrosis because his urinary stream had been diverted through an ileal conduit. The patient's right-sided hydronephrosis instead resulted from malignant extrinsic ureteral compression caused by progressive prostate cancer. The resulting obstruction required placement of a right percutaneous nephrostomy tube.

Conclusions

PUBS is an uncommon clinical finding that serves as an important diagnostic clue in patients with long-term urinary drainage devices. The presence of purple discoloration is highly specific and should prompt evaluation for a urinary tract infection. This case reflects the biochemical pathway responsible for the purple discoloration through the metabolism of dietary tryptophan by organisms such as *Providencia stuartii* and *Proteus mirabilis*. In this patient, the organisms were isolated from the ileal conduit collection bag, and urinalysis did not demonstrate hematuria, confirming that the discoloration initially perceived as blood represented the characteristic purple hue. The associated right-sided hydronephrosis was caused by malignant extrinsic ureteral compression from progressive prostate cancer at the level of the bladder or urethra. CT findings prompted relief of the obstruction through placement of a right percutaneous nephrostomy tube, while culture results guided antimicrobial treatment.

Overall, while PUBS itself is typically benign, it should not be dismissed as merely a cosmetic phenomenon. Instead, it should prompt investigation for urinary tract infection, including multidrug-resistant infection, and contributing factors, such as obstruction, constipation, or chronic urinary drainage devices. Early recognition and management can prevent complications and improve patient outcomes.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Fady Michael, Aram A. Namavar, Atefeh Kalantary, Timmer Verhaegh, Nathan R. Attalla

Acquisition, analysis, or interpretation of data: Fady Michael, Aram A. Namavar, Atefeh Kalantary, Timmer Verhaegh, Nathan R. Attalla

Drafting of the manuscript: Fady Michael, Aram A. Namavar, Atefeh Kalantary, Timmer Verhaegh, Nathan R. Attalla

Critical review of the manuscript for important intellectual content: Fady Michael, Aram A. Namavar, Atefeh Kalantary, Timmer Verhaegh, Nathan R. Attalla

Supervision: Fady Michael, Aram A. Namavar

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Acknowledgements

Fady Michael and Nathan Attalla contributed equally to the work and should be considered co-first authors.

References

1. Viswanathan S: Urine bag as a modern day matula . ISRN Nephrol. 2013, 2013:215690. 10.5402/2013/215690
2. Khan F, Chaudhry MA, Qureshi N, Cowley B: Purple urine bag syndrome: an alarming hue? A brief review of the literature. Int J Nephrol. 2011, 2011:419213. 10.4061/2011/419213
3. Sabanis N, Paschou E, Papanikolaou P, Zagkotsis G: Purple urine bag syndrome: more than eyes can see . Curr Urol. 2019, 13:125-32. 10.1159/000499281
4. Arivalagan B, Qureshi Z, Vashisht R, Nasr R, Afroze S: Asymptomatic urinary tract infection manifesting as purple urine. Indian J Med Microbiol. 2025, 58:100986. 10.1016/j.ijmmb.2025.100986
5. Mayo Clinic: bladder removal surgery (cystectomy) . Accessed: October 13, 2026: https://www.mayoclinic.org/tests-procedures/cystectomy/about/pac-20385108.
6. Kwarciak DC, Kilpatrick M, Robinson M: Peeing purple? Purple urine bag syndrome in the dying patient . J Pain Symptom Manag. 2024, 67:5e556-e557. 10.1016/j.jpainsymman.2024.02.347
7. Kalsi DS, Ward J, Lee R, Handa A: Purple urine bag syndrome: a rare spot diagnosis . Dis Markers. 2017, 2017:9131872. 10.1155/2017/9131872
8. Unusual urine color during catheterization . (2016). Accessed: March 11, 2026: https://www.aafp.org/afp/2016/1001/p572.
9. Armbruster CE, Smith SN, Yep A, Mobley HL: Increased incidence of urolithiasis and bacteremia during Proteus mirabilis and Providencia stuartii coinfection due to synergistic induction of urease activity. J Infect Dis. 2014, 209:1524-32. 10.1093/infdis/jit663
10. Kurotschka PK, Gágyor I, Ebell MH: Acute uncomplicated UTIs in adults: rapid evidence review . Am Fam Physician. 2024, 109:167-74.