

Case Report

Prolonged Indwelling Percutaneous Nephrostomy Leading to Purple Urinary Bag Syndrome in Palliative Care Setting: A Case Report

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ABSTRACT

Purple urine bag syndrome (PUBS) is a complication and a rare phenomenon associated with bacterial colonisation in bladder catheters in which urine turns purple in the tubing and the catheter bag. This condition can be distressing and panicking for the patients and their families as well as the medical staff caring for them. It is an interesting and unusual presentation that affects people with long-term indwelling catheters and chronic constipation. We report one such case in our hospital, a 73-year-old woman with stage 4 cancer of the vaginal vault, post-bilateral percutaneous nephrostomy (PCN) 4 months ago, currently on best supportive care, presented to the emergency room with symptoms of urosepsis, while a purple urine bag may appear innocuous and not need any particular care beyond replacing the catheter and giving the patient the proper antibiotics, it may indicate an occult urinary tract infection (UTI), which can have catastrophic effects in a patient using a urinary catheter for an extended period of time. Only a few examples of PUBS with an underlying nephrostomy have been documented in the literature. This is a case of a palliative care patient who had a poor prognosis despite receiving the right antibiotic treatment for an upper UTI that caused purple staining of the PCN catheter bag. Using this case report as a guide, we could manage a complex UTI in a palliative care context.

Keywords: Purple urinary bag, Urosepsis, Percutaneous nephrostomy, Catheter-associated urinary tract infection, Indwelling catheter

INTRODUCTION

A rare, benign condition known as purple urine bag syndrome (PUBS) causes the urinary catheter system to turn purple. It results from urinary tract infections (UTIs) with specific bacteria containing the enzymes: Sulphatases and phosphatases that produce the pigments: indigo (blue) and indirubin (red), a mixture of which turns the catheter bag purple.^[1] Female gender, non-ambulatory lifestyle, constipation, chronic catheterisation using either a silicon or polyvinyl chloride catheter bag and renal illness often are risk factors.^[1-4]

Other conditions that mimic purple urine include

- An inherited tryptophan metabolic abnormality known as 'blue diaper syndrome', which manifests in infancy
- High dietary intake of tryptophan-rich foods such as beets and blackberries^[3]
- Steroidal or bile acid conjugate.

A PUBS diagnosis is based on the purple color of the plastic catheter bag, not the urine formation itself.^[1] Some

academics contend that King George III of England, who was diagnosed with porphyria, reported PUBS much earlier in historical times.^[1] It is preemptory to recognise this consequence to prevent a false diagnosis and inappropriate care. A microscopic examination and culture sensitivity is fundamental for goal-directed treatment. Preventive care, accomplished through patient and family education, is more crucial than curative care for palliative patients. It is up to the palliative physician to recognise these high-risk individuals.

CASE REPORT

A 73-year-old woman with vaginal vault cancer stage 4, having received 10 fractions of palliative RT to the vagina, and having received 1 cycle of chemotherapy, appeared to be doing well at home until one week before her admission. She presented to the emergency room with complaints of shortness of breath, fever, constipation, generalized weakness, and unresponsiveness. At the time of presentation, her oxygen saturation was 89% on room air, temperature 101.9F, respiratory rate of 24, heart rate of 140 and blood

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pressure measuring 110/65. Only further examination revealed a purple urinary bag in one of the percutaneous nephrostomy (PCN) stents that were placed 4 months ago due to a history of bilateral hydronephrosis, leading to chronic kidney disease, due to the impingement of vaginal vault mass on both the ureters. She had a history of acute renal failure due to the underlying tumour (post-renal acute kidney failure). The catheter bag that showed purple colour had <50 mL of urine output at the time of presentation. Her Karnofsky performance status was 40. The family said that they noticed a colour change 3 days ago, but thought it was due to improper cleaning. A provisional diagnosis of PUBS was made as a spot diagnosis as there was a consistent change in colour throughout the bag on visual examination. Blood investigations revealed a high white blood cell count of 16,760/mm³, urinary pH was 7.5 (alkaline), with moderate leukocytes in the urine, and tested positive for nitrates and leucocyte esterase. There was no trace of ingestion of medications/food items, poisonous materials and other causes such as haematuria or porphyria that might alter the colour of urine over the past week. She was started on empirical IV cefoperazone and sulbactam combination [Figure 1].

The antibiotic choice was made according to local bacterial resistance patterns; she was started on levofloxacin 500 mg along with other supportive medications. Her urine culture grew a mixture of organisms, namely *Escherichia coli* >10⁵ CFU/mL and *Klebsiella* spp. (Gram-negative bacteremia). On day 5, the urine discoloration subsided, but clinically the patient showed no improvement due to her disease burden and ongoing sepsis with multi-organ failure after the purple urinary bag had presented for over a week. The advanced nature of the disease and poor prognosis were explained to the family attendees and was decided for no aggressive treatment and preferred only palliative intent. She became

delirious with increased breathlessness and fever spikes, her condition gradually deteriorated and expired a day after her discharge.

DISCUSSION

A catheter-associated UTI (CAUTI) is defined as ‘A UTI that occurred in a patient with a catheter in place at the time of infection.’^[5] Furthermore, UTIs are among the most common causes of sepsis presenting to hospitals. Longer antibiotic courses are necessary for complicated UTIs, which also present with greater morbidity and a higher risk of treatment failure, occur in elderly or immunocompromised patients, involve urinary catheters after instrumentation, are caused by atypical organisms, occur in patients with impaired renal function and require additional workup.^[6]

Several hours or days after catheterisation, the plastic urinary catheter bags can turn purple. Moreover, when the drainage system remains in place for longer, the colour intensity grows.^[1]

Multiple bacterial UTIs with specific enzymes are thought to be the cause of the colouration, most frequently Gram-negative bacteria such as *Klebsiella pneumoniae*, *E. coli*, *Providencia stuartii* and *Providencia rettgeri*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Morganella*, *Citrobacter* spp., Enterococci, and Group B streptococci. *E. coli* was the causal pathogen most usually encountered in PUBS, accounting for 35.6% of cases, followed by mixed bacterial growth in 25.3% of cases.^[2,3]

The series of biochemical conversion reactions that lead to purple colouration are^[1] depicted in [Figure 2].

According to a prospective study of 1497 catheterised patients by Tambyah and Maki, the incidence of CAUTI was much higher in women than in men. Hence, PUBS which is also one of the CAUTIs happened in those old age women compares reasonably with this case study.^[7]



Figure 1: An initial purple urinary bag is shown, followed by a post-antibiotic resolution.

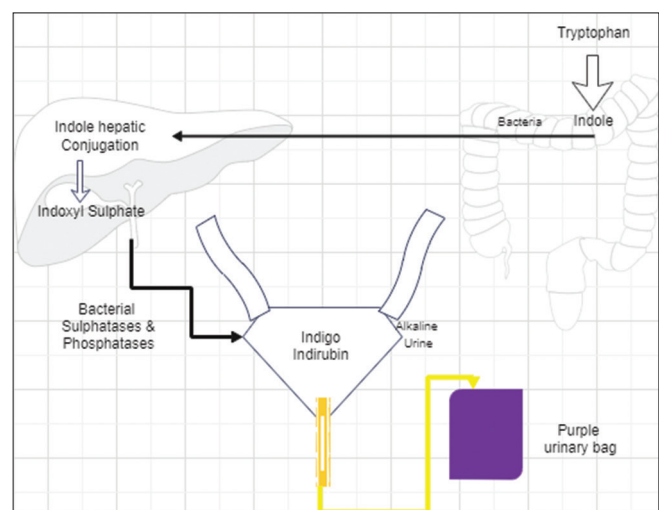


Figure 2: Series of biochemical conversions that lead to purple urine discoloration.

In a study published in critical care, the investigators reported that patients with gram-negative bacteremia exhibited a greater inflammatory response as evidenced by higher CRP and interleukin-6 (IL-6) serum levels than patients with gram-positive bacteremia, and were more likely to develop septic shock. The gram-negative bacteremic group demonstrated a higher mortality rate of 40% versus 28% in the gram-positive group.^[5]

According to the reported articles, most of the patients that presented PUBS were asymptomatic.^[8,9] Some authors argued that it was not necessary to treat patients aggressively.^[1,7] There have been occurrences of PUBS in patients with chronic renal failure who are haemodialysis dependent as well as in patients with nephrostomy tubes, and long-term indwelling catheter tubes.^[2]

Cancer patients are particularly susceptible to infections due to a variety of disease-related and therapy-induced factors with infections being one of the leading causes of death,^[8] there is a paucity of information describing management. These patients were described as polysymptomatic in this final phase of care, with no specific symptoms controlled by infection management.

Ultimately, hospitalisation and long-term care pose additional risks due to indwelling catheters and the possibility of transferring resistant strains of bacteria.^[7] Furthermore, the conversion of silent bacteriuria to symptomatic septicemia is seen in urinary tract obstruction, which if unrelieved progresses to bacteremia and septic shock.^[8]

Challenges faced to manage this case

- a) Failure to properly intervene early in the septic process
- b) Treating the patient with PUBS aggressively with antibiotics is a point of debate and has to be further investigated
- c) As we go by the general dictum In a palliative care patient, 'Primum non-nocere' (means: It may be better to do nothing rather than intervene and potentially cause more harm than good), by following the principle of 'Doctrine of double effect'^[4] (means: Sometimes it is permissible to cause a harm as a side effect of bringing about a good result), the acute presenting symptoms could have been aggressively managed in the benefit of the patient.

New learnings

- This reflects the importance of ordering timely, appropriate antibiotic therapy along with fluid resuscitation
- PUBS in a nephrostomy tube has to be managed aggressively while a conservative approach is preferred in PUBS of lower urinary catheters^[1,3,9]
- This case report raises a clinical issue in caring for an advanced cancer patient presenting with complicated

UTI along with multisystem deterioration requires an individualised approach.

Initial antibiotic choice in septic or systemically ill patients will depend on unique patient characteristics and local bacterial resistance antibiograms before receiving specific culture findings.^[6] Complicated UTIs can cause sepsis leading to multi-organ dysfunction. Often, resuscitation comes before formal therapy. An extremely septic patient may require extensive fluid resuscitation and broad-spectrum antibiotics given in the emergency room.

Future implications to apply the skills and knowledge gained in clinical practice: A once-in-a-while examination of urine samples for patients with a PCN stent can help prevent any CAUTI.

Therefore, efforts must be made to enhance catheter care and nephrostomy tube care to prevent CAUTIs. In the context of palliative care, choosing to treat or not to treat a patient may be challenging and call for a specific strategy.^[8] Antibiotic treatment during the latter days or weeks of life is debatable. It can be difficult to predict whether using antibiotics will alleviate an illness or, conversely, whether not using them would cause death. While withholding antibiotics may be a part of a palliative care plan for some terminally ill patients, when life-threatening infections cause discomfort, using them is thought to be a good palliative care strategy. Choosing to treat can require additional diagnostic tests, antibiotic side effects, and intravenous lines, which can be burdensome for patients.^[8]

Adequate symptom control through antibiotics cannot always be achieved. It must be anticipated that infection may occur as a terminal event in patients with advanced cancer. In the context of palliative care, choosing to treat or not to treat a patient may be challenging and call for a specific strategy.^[8] Further, research in this area will help develop a consensus for the management of complicated UTIs at the end of life.

CONCLUSION

PUBS is a rare, mostly benign condition, it is imperative that a tailored approach is implemented based on the unique characteristics of each individual. The management of complex infections in a palliative setting is particularly challenging. It is vital to align our goals of care with those of the patient's wishes and need education for families/caregivers in the aspect of preventing UTIs. Hence, risk-benefit thinking is always helpful, be it in improving the quality of life of the patient or decreasing debility. Nevertheless, physicians should recognise that this syndrome may signal an underlying UTI. It is essential to recognise these cases as high-risk in a timely and appropriate manner to intervene early. The right antibiotic for the right duration is key and with the utmost CAUTI CARE BUNDLE, PUBS is almost always avoidable.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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