

CASE REPORT

Purple urine bag syndrome: a case report and review of the literature

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Abstract

Purple urine bag syndrome (PUBS) is a rare and striking manifestation associated with urinary tract infection involving bright purple discoloration of the lining and tubing of a urinary catheter bag. We present the interesting case of a 90-year-old female patient who developed PUBS and include a review of the relevant literature to date. Uniquely, in this case, PUBS acts as an important clinical sign in supporting the diagnosis of urinary tract infection in a high-risk patient.

INTRODUCTION

Urine discoloration is a very common clinical sign encountered in clinical practice. Red urine discoloration is usually attributable to the differential diagnoses associated with macroscopic haematuria. Brown discoloration may indicate biliary obstruction or hepatocellular disease.

Purple urine discoloration, however, is a rarely reported presentation. It can cause great concern for patients, family members and healthcare workers when encountered. In the vast majority of circumstances it is a benign process, which does not require intervention. Purple urine bag syndrome (PUBS) is, however, an important clinical sign of urinary tract infection.

CASE REPORT

A 90-year-old female was admitted to hospital following a mechanical fall in her nursing home. X-ray confirmed a non-displaced, intertrochanteric fracture of the proximal right femur requiring surgical management.

Communication proved to be very difficult due to her history of progressive, advanced vascular dementia. She was disorientated in person, place and time and had significant

expressive dysphasia. Relevant medical history included recurrent urinary tract infections, thromboembolic disease and osteoporosis.

In the preoperative period, the patient became more confused and agitated than her baseline but remained haemodynamically stable and afebrile. She also developed constipation and required urinary catheterization due to acute urinary retention.

During this period, nursing staff noticed that the urinary catheter bag and the urine within it had become a 'luminous purple colour' (Fig. 1). Due to the patient's profound expressive dysphasia, the presence of urinary symptoms could not be confirmed. Dipstick urinalysis was performed and a catheter specimen of urine was sent to the laboratory for microscopy, culture and sensitivity analysis.

The urine tested positive for nitrites, protein, haemoglobin and leucocytes and had a pH of >9. Treatment for urinary tract infection was commenced with a course of Nitrofurantoin 50 mg orally four times daily for 7 days, as per hospital guidelines. The catheter bag was replaced and oral hydration was encouraged. Urine culture subsequently showed a heavy mixed growth of >100 000 cfu/ml bacteria (at least three bacterial species).

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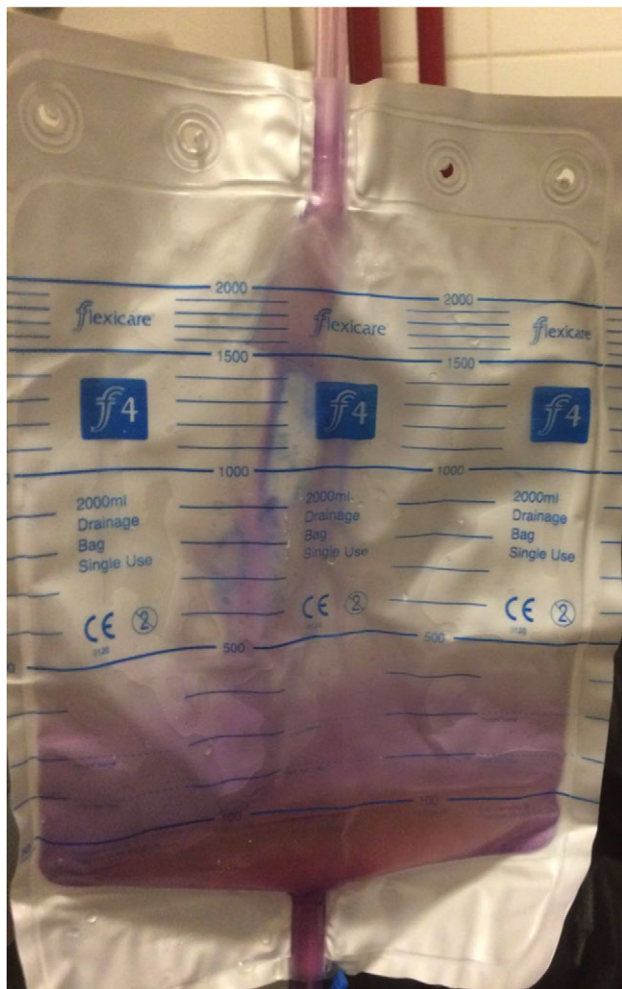


Figure 1: Image of the urinary catheter bag showing purple staining in this case.

In the following days, the patient became considerably less agitated and confused, underwent surgery and recovered well. Four days later, her replaced catheter bag had remained normal in colour and a further urine sample showed no bacteria. She progressed quickly with physiotherapy and was discharged to her nursing home soon after.

DISCUSSION

PUBS was first reported in *The Lancet* in 1978 [1]. Despite being a very rarely reported and poorly understood clinical presentation, its prevalence has been seen to be as common as 9.8% [2] and 16.7% [3] in studies of certain cohorts of long-term catheterized patients.

The hypothesis of PUBS, accepted by most authors, involves a sequence of reactions beginning with dietary intake of tryptophan [4], Fig. 2. Tryptophan deamination to indole, hepatic conjugation to indoxyl sulphate, bacterial enzyme action to produce indoxyl and further substrate oxidation in the urinary tract results in the production of indigo and indirubin pigments [4]. These pigments combine, causing striking purple staining of the PVC lining of the urinary catheter bag. Proposed risk factors include constipation [5], female gender [5], high bacterial load in the urinary tract [5], an alkaline urine environment [5] and a

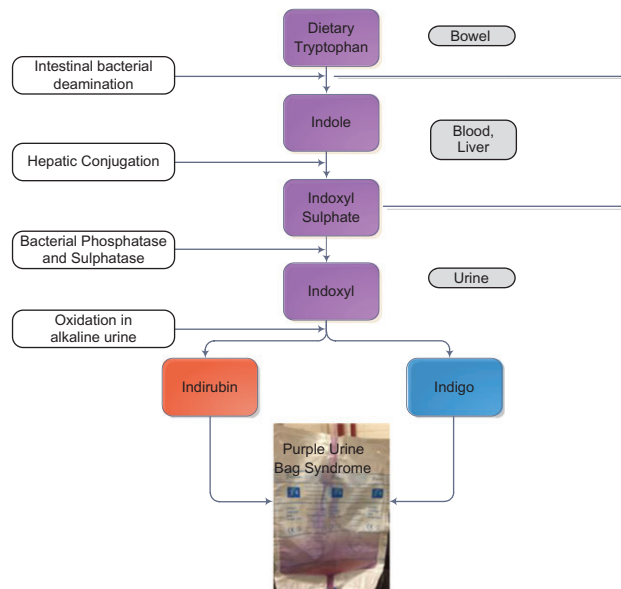


Figure 2: Flow chart outlining the development of 'PUBS'.

diet rich in tryptophan [6]. Bacteria species most commonly implicated include *Providencia stuartii* and *Klebsiella pneumoniae* [4], although, association of PUBS with many other bacteria, including *Proteus* species, has also been described [4, 7]. The bacterial enzymes involved have been shown to have indoxyl sulphatase and indoxyl phosphatase activity which is not present in strains unable to produce indigo pigment [4].

Other observations made include increased incidence of PUBS in patients on haemodialysis with chronic kidney disease [8] and cases of unexplained purple urine in acidic urine environments [9] or without indicanuria [5].

In this case, PUBS acted as a valuable clinical sign to support the diagnosis of urinary tract infection where profound dementia limited the patient's ability to communicate. The clinical importance of this observation is reinforced by the fact that up to 90% of patients who develop PUBS have been shown to have comorbid dementia [6] and an association with infections of increased morbidity and mortality [10] has been demonstrated. We would urge healthcare providers to be cognisant of this association.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Oxford Medical Case Reports* online.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to disclose. The authors declare that the work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere including electronically in the same form, in English or any other language, without the written consent of the copyright holder.

INFORMED CONSENT

Informed verbal consent was obtained from the patient's next of kin. We feel that the article is sufficiently anonymised but

would be happy to obtain a signed consent form should one be sought by the journal.

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AUTHORS' CONTRIBUTION

B.P.T., E.P. and D.N. conceived the initial idea of the study. B.P.T. acquired the data for publication and drafted the article and all authors revised it critically for important intellectual content. All authors approved the final version of the manuscript to be submitted.

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