

## Purple Urine Bag Syndrome: A Case Report

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### Abstract

Purple urine bag syndrome (PUBS) is an extremely rare entity, occurring predominantly in elderly, constipated women, or ones who have been chronically catheterized. It has been associated with urinary tract infections caused by bacteria which produce sulphatase/phosphatase. The etiopathogenesis behind this is the indigo (blue) and indirubin (red) pigments released by these bacteria thus, rendering the purple color to the mixture. We present a case report of this rare phenomenon occurring in a 76-year-old woman.

### Keywords

Purple urine bag syndrome, Chronic constipation, Urinary tract infection

### Introduction

Purple urine bag syndrome (PUBS) is an extremely rare entity, occurring predominantly in elderly, constipated women, or ones who have been chronically catheterized. It has been associated with urinary infections caused by bacteria which produce sulphatase/phosphatase. The etiopathogenesis behind this is the indigo (blue) and indirubin (red) pigments released by these bacteria thus, rendering the purple color to the mixture. We present a case report of this rare phenomenon occurring in a 76-year-old woman.

### Case Report

A 73 years old female, known case of hypertension and an old ischemic stroke, presented to our hospital with complaints of burning micturition and confusion since 10 days. There was no history of fever, abdominal pain or vaginal discharge. On examination, she was found to be in mildly confused disoriented with place and time, with a pulse rate of 85/minute and an elevated blood pressure of 150/70 mm Hg. Systemic examination done was unremarkable. Routine blood investigations done revealed no abnormalities (Table 1). Blood culture sent was sterile.

The patient was catheterized since 6 month draining purple colored urine for last 7 days (Figure 1). Urine routine sent showed 0-2 pus cells, nil glucose, 30 mg/dl protein with few epithelial cells and 1+ bacteria. Urine culture was sent which revealed gram negative bacilli – *Providencia rettgeri* with a colony count of 10<sup>5</sup> cfu/ml. Sensitivity testing was reported sensitive to almost all antibiotics except Ampicillin and Colistin with intermediate resistance to Imipenem.

She was then started on Injection Ciprofloxacin 1 gm Intravenously twice a day. The patients' sensorium gradually improved after initiation of treatment and she was discharged with Tablet Ciprofloxacin 500mg twice a day and advice to follow-up in our Out-patient department after 1 week. At follow-up, patients' urine was found to be clear in color and repeat urine culture sent was sterile.

**Table 1:** Routine investigations done at hospitalisation.

Investigations	Values
Hemoglobin	10.9 gm/dL
Total Leucocyte count	7100 per cumm (57% neutophils, 29% lymphocytes, 10% monocytes, 3% eosinophils and 1% basophils)
Platelet count	269000 per cumm
Random blood sugar	93 mg/dL
Serum creatinine	0.72 mg/dL
Serum sodium	134 mEq/L
Serum potassium	4.2 mE/L
Alanine transaminase	22.9 U/L
Aspartate transaminase	19.5 U/L
Alkalline phosphatase	182.9 U/L
Urine routine and deposit	Straw-colored, Protein-30, Glucose-nil, Nil RBC, A few epithelial cells, 1+ bacteria
Vitamin B12	930 pg/ml
Thyroid-stimulating hormone	1.76 mU/L



**Figure 1:** Purple colored urine drained on catheterization in the hospital.

## Discussion

Purple urine bag syndrome (PUBS) was first reported in literature in the year 1978. This name is due to the purple discoloration of the urine, which is usually seen in women and chronically debilitated patients [1] with long term indwelling urinary catheters. PUBS can be often distressing for patients, family members and healthcare workers who are unaware of this association. This condition is strongly associated with urinary tract infections [2], where the bacteria responsible

for the infection releases indigo and indirubin pigments which precipitate and react with the synthetic materials of the catheter and urinary bag, giving rise to the purple colored urine.

Although an uncommon occurrence, the prevalence of PUBS has been reported to be as high as 9.8% in institutionalized patients due to long-term indwelling urinary catheter [1, 2]. PUBS has been shown to be associated mostly with the female gender, alkaline urine, constipation, institutionalization and the use of plastic urinary catheter and bag. These factors in combination with the higher bacterial load in urine, facilitates the development of PUBS.

Most people believe that purple urine is a mixture of indigo and indirubin which are metabolites of tryptophan, which is metabolized in the gastrointestinal tract by gut bacteria. This produces indole that is further absorbed into the portal circulation and converted to indoxyl sulphate in the liver. Majority of this indoxyl sulphate is excreted into the urine and metabolized into indoxyl sulphatase produced by some bacteria [3].

However, there have been some reports in literature where patients presented with a purple urine bag without indicanuria and the violet pigment may be either a steroidal or bile acid conjugate. The pathophysiology behind chronic constipation leading to this condition is due to the bacterial overgrowth in the colon seen in chronic constipation which increases the conversion of tryptophan into indole. Catheter associated urinary tract infection increases the conversion of indoxyl sulphate into indoxyl [4-9]. So, PUBS is most often observed in chronically catheterized and constipated people.

Several bacterial species have been reported in association with PUBS including *Providencia stuartii*, *Providencia rettgeri*, *Klebsiella pneumoniae*, *Proteus species*, *Escherichia coli*, *Enterococcus species*, *Morganella morganii*, and *Pseudomonas aeruginosa* [5, 6]. Furthermore, other factors which might play an important role are presence of a certain concentration of the pigments for the precipitations to become visible, the presence of alkaline urine, and also the type of materials used to manufacture the urinary catheter and bag [7-9].

In our patient, the major factor leading to development of the purple urine bag syndrome was urinary tract infection due to *Providencia rettgeri*. In most patients, treatment of the urinary tract infection in accordance with the susceptibility report leads to resolution of the color of the urine back to normal [8-10], as seen in our case.

## Conclusion

Physicians should be aware of this syndrome as sudden discoloration of the urine can be distressing to the family and to the physician if unaware of this phenomenon. We should suspect underlying recurrent UTIs, due to improper care of the urinary catheters and improper sanitation and initiate adequate management, as it can be associated with significant morbidity and mortality in case of diagnostic delays, though a relatively benign and easily treatable condition.

## Conflict of Interest

The authors declare no conflict of interest.

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