



Inflammation and infection

## Purple urine bag syndrome: A simple and rare spot diagnosis in Uroscopic rainbow

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### ABSTRACT

Purple urine bag syndrome (PUBS) is benign pathology but an alarming symptom to the patients and his/her relatives because of purple discoloration of urine in collecting bag and tubing. Colour of the urine is purple because of tryptophan metabolite named Indigo and Indirubin. In urinary tract infection, sulphatase and phosphatase producing bacteria involved in pathogenesis of PUBS. Here, we discuss a case of 60 year male patient with spinal cord injury with neurogenic bladder presented in surgical emergency with purple colour urine in urobag.

### Introduction

Purple urine bag syndrome (PUBS) is the rare benign condition in patients of a urinary tract infection with alarming symptoms of purple colour urine. It was first reported in 1978 by Barlow and Dickson.<sup>1</sup> Although, it is not a harmful complication of Urinary tract infection but it is very distressing for patients and their family members due to the purple colour of urine. Therefore every clinician should know this rare entity for proper management of patients. Knowledge of this rare phenomenon can prevent the over and under treatment of such benign pathology.

### Case report

A 60-year-old man presented in emergency OPD with an indwelling urinary (Foley's) catheter having purple discolorations of urine (Fig. 1). Patient had history of fall from height 2 year back with paraplegia and urinary incontinence due to spinal cord injury, for which he was catheterized so long. General Physical examination was normal with stable vitals. Higher mental function was normal with oriented to time place and person with paraplegia. His urine colour was normal but the urobag had purple discoloration. A spot diagnosis of Purple urine bag syndrome was made and urine was sent for routine microscopic examination and culture and sensitivity. Total and differential leukocyte counts were normal. Routine microscopic examination showed plenty of

leucocytes with urinary pH of 7.6. Escherichia coli were found in urine culture. Catheter was changed and antibiotic (Ciprofloxacin) was given according to sensitivity. PUBS resolve once the catheter was changed. No mortality and no aggressive treatment were required in this case.

### Discussion

Chin- Chung Shiao done a community based study on PUBS in 2008 and found prevalence of PUBS in chronic urinary catheterized patients is 8.3–16.7%. In PUBS, the colour of urine itself remain same but there is a Sulphatase and phosphate producing bacterial reaction of Providencia, Escherichia Coli, Proteus mirabilis or Klebsiella pneumonia in the urobag in long term catheterisation that's makes the purple hue mainly in alkaline urine<sup>1</sup> because alkaline urine facilitates indoxyl oxidation. That's why, it is more common in alkaline urine but PUBS has also been reported in acidic urine.<sup>2</sup> As we know female urethra is more prone for infections due to its short length and close proximity to anal opening. So, it is more common in females as compared to males.<sup>3</sup> Severe constipation and intestinal obstruction, increased transient time and also substrate for bacteria can lead to PUBS. High bacterial load increase the availability of sulphatase and phosphatase that facilitate the pathogenesis of PUBS. Dehydration, chronic kidney disease, and azotemia are the other risk factors for PUBS due to impaired indoxyl sulphate clearance.<sup>4</sup> This condition can come from asymptomatic bacteriuria and if the patients is totally asymptomatic (as in our case), no need for aggressive treatment.

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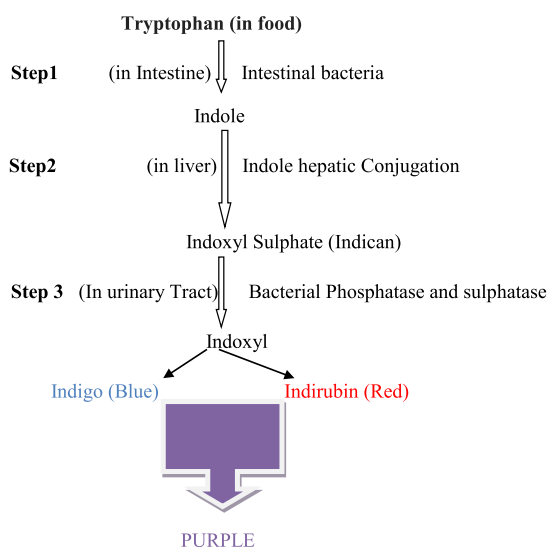
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**Fig. 1.** Showing the purple colour of urine in urobag makes a spot diagnosis of Purple urine bag syndrome. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)



**Fig. 2.** Flow chart describing the pathogenesis of PUBS.

**Pathogenesis**

Bacteria metabolize the tryptophan to Indigo and Indirubin which are the blue and red pigment respectively. Tryptophan inside the gastrointestinal tract is converted to Indole by gastrointestinal flora. This Indole undergoes Indole hepatic conjugation in liver via portal circulation and form indoxyl sulphate. Third step occur in the urine where Bacterial sulphatase and phosphatase convert it to Indoxyl which oxidize to Indigo and Indirubin. These two pigments in urobag make the purple hue of urine (Fig. 2). It is the pathognomonic of PUBS.

Indirubin downregulates PLK1 and PIN1 oncogenes in human body and also reduces expression of CDC25B gene (which is responsible for production of CDC25B enzyme, causing cell reproduction).

If we see the Uroscopic rainbow (Table 1) purple colour of urine makes a spot diagnosis of Purple urine bag Syndrome.

Few cases were reported in previous studies which required an aggressive management of PUBS. Pillai et al. described a case of PUBS with cellulites of left lower limb with history of type 2 diabetes mellitus with peripheral neuropathy, hypertension, dyslipidaemia and post-operative case of Whipple’s for carcinoma of pancreas. She was managed with intravenous antibiotics according to culture sensitivity report, hemodialysis for acute renal failure and blood transfusion.<sup>5</sup> Khan F et al. mention a case of PUBS after spinal cord injury with neurogenic bladder for which suprapubic catheterisation was done. He also required aggressive treatment for constipation as well as UTI. Tasi YM et al., in 2009 reported a case of PUBS with Fournier’s gangrene which required

**Table 1**  
Uroscopic rainbow.

S. no	Colour of Urine	Etiology
1	Transparent	Excessive hydration
2	Straw colour/ Pale yellow	Normal
3	Amber	Dehydration
4	Dark/ Orange Yellow	Liver and Bile duct disease
5	Orange	Rifampicin therapy, dehydration, UTI, Isonizide, Sulfasalazine
6	Red	Hematuria
7	Tea Coloured	Myoglobinuria (Muscle injury), Metronidazole therapy
8	Blue- Green	Propofol infusion syndrome, Pseudomonas, Blue diaper syndrome, methylene blue, food dye
9	Grey- black	Iron, laxatives, alkaptonuria, porphyria, metastatic melanoma
10	White	Protenuria, Pyuria, Chyluria, lipiduria, Filariasis, lead, mercury, UTI with neutrophilia
11	Purple	Purple urine bag syndrome

aggressive debridement. Bhattarai M et al., in 2013 reported PUBS with medical history of dementia, hypertension, hyperlipidemia, and recurrent UTI with altered mental status which required intravenous antibiotics, hemodialysis but patient died despite of all efforts under ICU care.

### Conclusion

So we conclude that, female gender, increased dietary tryptophan, increased urine alkalinity, severe constipation, chronic catheterization, high urinary bacterial load and renal failure are the risk factors for purple urine bag syndrome. Although, it is a benign disease but sometimes requires aggressive management. If we have knowledge of Uroscopic rainbow, we can make spot diagnosis of this rare entity.

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