

Purple urine bag syndrome: an alarming and rare phenomenon of urinary tract infection

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Abstract

Purple urine bag syndrome (PUBS) is a rare but striking and an alarming medical phenomenon observed in patients having indwelling urinary catheters with co-existing urinary tract infections. It commonly occurs in bedridden elderly with constipation and long standing indwelling urinary catheters, and denotes bacterial urinary tract infection. The authors report a case of 77 year-old Indian male with purple coloration of his urinary drainage bag in the context of a urinary tract infection caused by *Pseudomonas aeruginosa*.

Keywords: Purple Urine Bag, Urine Discoloration, Tryptophan, Urine Infection.

Introduction

Purple urine bag syndrome (PUBS) is a rare but striking medical phenomenon seen in patients having long-term indwelling urinary catheter and is a manifestation of urinary tract infection (UTI) [1]. Although a benign clinical condition, yet the purple discoloration of the urinary bag or catheter tubing becomes a cause of concern for the patients or their attendants as well as for the physician. The urine typically clears with the resolution of the bacteriuria. This condition typically develops hours or days after urinary catheterization and has been related to urinary tract infection caused by certain gram negative bacteria which produce phosphatase or sulfatase [1]. Despite the striking appearance, purple urine bag (PUB) discoloration may still be neglected or ignored due to unawareness among the treating physicians, of its association with bacteriuria and may not be given appropriate treatment which may lead to urosepsis leading to significant morbidity and mortality.

This syndrome is usually reported to occur in elderly

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females with constipation and alkaline urine and long term indwelling urinary catheters [2]. We herein, present an interesting case of an elderly man who had a purple colored urine bag.

Case Report

A 77 year old male, known case of hypertension, chronic obstructive lung disease and chronic kidney disease on maintenance hemodialysis was admitted in medical intensive care unit (MICU) with complaints of breathlessness, constipation and generalized weakness of 1-2 days duration. His vitals: blood pressure 90/50mmHg, heart rate 120/minute, respiratory rate 24/minute and blood oxygen saturation of 92% on oxygen flow@4litres/minute. His systemic examination: chest-bilateral crepitations, heart sounds-normal, abdomen- soft, distended, sluggish bowel sounds, neurological- drowsy but arousable with no focal neurological deficits. The patient was started on antibiotics, given intravenous fluids, BiPAP (bilevel positive pressure) support, required vasopressor support for hypotension and urinary catheter was inserted. His CT (Computerized Tomography) of the chest revealed bilateral pneumonia and CT abdomen with oral contrast

Case Report

revealed features of chronic constipation. His urine routine showed a significant number of pus cells with pH 8.0 and the culture later grew more than 100,000 colonies of multi drug resistant *Pseudomonas aeruginosa*. His sputum culture grew multi drug resistant *Klebsiella pneumoniae*. The antibiotics were modified accordingly. The patient was started on Ryles tube feeds. It was noticed that his urine bag turned purple color (Fig 1) and when urine was collected for sampling



Fig 1: Purple discoloration of urine bag.

it was dark brownish in color (Fig 2). His urine bag was changed and the urine cleared up. There was no medication given to the patient that could have caused urine discoloration, and the dietician was also consulted regarding any dietary product given which could have caused this phenomenon. The patient improved gradually and recovered with stable vitals. The occurrence of this phenomenon was attributed to the *Pseudomonas* infection of the urinary tract.



Fig 2: Dirty dark brown colored urine from urine bag

Discussion

The purple urine bag syndrome was first described in 1978 [3]. The abnormal color of urine has always created concern and baffled the mind of the treating physicians [4]. The presence of indigo was linked to the metabolism of tryptophan to indoxyl sulfate in the clinical setting of constipation and bacterial decomposition [3].

The urine itself is not discolored to purple color in this condition, but usually has a dirty brown color of infected urine (Fig 2).

Pathophysiology [5]: The tryptophan present in food is metabolized (deamination) by bacteria in the intestine, usually in a patient with constipation or gastro paresis (causing intestinal bacterial overgrowth). This metabolism produces indole, which is then absorbed into the portal circulation, undergoes series of detoxification transformations (conjugation) in the liver and subsequently is converted into indoxyl sulfate (indican). Indican is then excreted in the urine and metabolized into indoxyl by phosphatase/sulfatase produced from gram negative bacteria. Oxidation of free indoxyl in an alkaline urine will produce two main

pigments — indigo (blue) and indirubin (red) — which react with the plastic (polyvinylchloride-PVC) of the urine bag and result in the purple discoloration.

PUBS have been associated with multiple gram negative bacteria including *Pseudomonas* species, *Morganella* species, *Proteus* species, *Providencia* species, *Klebsiella pneumoniae*, and *Enterobacter* species. Gram negative bacteria producing sulfatase and phosphatase are important in the pathogenesis [5,6]. Dehydrated status or hypovolemia might also be important factors, as the serum concentration of indican has been found to be correlated with advancing chronic kidney disease and azotemia [7].

The prevalence of PUBS is associated commonly with female patients, constipation, urinary tract infection, chronic debilitation, alkaline urine, and high urinary bacterial counts [2,3,5-8]. Though rare, the prevalence of PUBS has been reported to be 8.3% to 16.7% in patients with long-term indwelling urinary catheter use [2,8]. Tryptophan is an essential amino acid (cannot be synthesized in human body) and is found in most of the protein-based foods or dietary proteins. It is particularly plentiful in all forms of plant protein (sesame,

chickpeas, sunflower seeds, pumpkin seeds, spirulina, bananas, peanuts, oats), milk, yogurt, cheese, eggs, poultry, red meat, fish.

Conclusion

The unusual purple discoloration of urine bag can be alarming, but this syndrome only indicates the presence of urinary tract infection that can be easily recognized and treated early. The awareness of this syndrome needs to be spread among the clinicians so that the treatment for urinary tract infection is initiated early, to prevent the morbidity and mortality arising if it progresses to systemic septicemia. This is particularly so as the patients in which this syndrome has been reported often are elderly, debilitated, and have significant comorbid conditions.

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