Purple urine bag syndrome: A case report and review of literature

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ABSTRACT

Purple urine bag syndrome (PUBS) is an infrequent condition, seen mostly in elderly female patients, characterized by an intense purple discoloration of contents of urine bag following long-term indwelling urinary catheterization. The purple discoloration is most often due to the presence of indigo and indirubin pigments which are metabolites of tryptophan. Urinary bacteria with indoxyl sulphatase activity metabolize indoxyl sulphate to produce indigo and indirubin, particularly in alkaline urine. We report an elderly woman with a urinary tract infection and constipation who presented with PUBS. The purple urine disappeared after antibiotic therapy and change of the urine bag. To the best of our knowledge, this is the first case of PUBS reported from this region.

Key words: Purple urine bag syndrome, tryptophan, urinary catheters

Introduction

Purple urine bag syndrome (PUBS) is an uncommon condition seen in patients having long-term urinary catheterization. It is a rare manifestation of urinary tract infection (UTI). Although it is an essentially benign condition, yet the purplish discoloration of the urinary catheter, tubing, and bag may be distressing for the patients, their families as well as for healthcare providers. We present an interesting case of an elderly woman who had a purple colored urine bag. To the best of our knowledge, this is the first case of PUBS reported from this region.

Case Report

An 83-year-old bed bound female, with a history of dementia who had an indwelling urinary catheter in place for last 3 months, presented to us in the outpatients department with the complaints of nausea, vomiting, decreased oral intake, chronic constipation, and purplish discoloration of the urine bag and tubing. She had been having these complaints on and off (three times over a period of 1 month) before coming to us and every time she was treated empirically with oral antibiotics (records not available) for suspected UTI. Her urinary catheter and bag were changed each time she would get purple discoloration and her symptoms would get better. When she presented to our facility, she was hemodynamically stable and was afebrile. Physical examination was unremarkable except for mild dehydration. She was noticed to have purple colored urine in the urine bag, along with purplish discoloration of the tubing and the bag [Figure 1]. Investigations revealed a hemoglobin of 12 g/dl and total leukocyte count of 11×10^9. Her blood urea was 40 mg/dl, serum creatinine 0.9 mg/dL, serum sodium 135 mEq/L, potassium 4.2 mEq/L, chloride 110 mEq/L, and bicarbonate was 20 mEq/L. Her urine dipstick showed a pH of 8.0, specific gravity 1.020, and it was positive for nitrite. Urine microscopy revealed 4-6 leucocytes, 3-5 red blood cells, and triple phosphate crystals. Urine culture was sent and she was started on oral cefixime (third generation cephalosporin). Lactulose was also prescribed for relieving constipation. The patient was seen after 3 days, and reported resolution of symptoms and disappearance of purple color. Urine culture grew greater than 10^5 colony forming units of *Escherichia coli* sensitive to cefixime. She completed a 10

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Figure 1: Purple discoloration of urine bag at the time of presentation

days course of cefixime and has been symptom free till the last follow-up visit.

Discussion

PUBS is a rare phenomenon in which the contents of urine bags turn purple or blue following long-term urinary catheterization. The first ever case of PUBS was described in 1978[1] by Barlow and Dickson. However, it is interesting to know that in the nineteenth century, a famous historical figure (the English King George III) was believed to have this syndrome.[2]

The prevalence of PUBS has been variably reported in different series from various regions, ranging from as low as 8.3%[3] to as high as 42.1%.[4] Most of the published literature on PUBS is based on case reports, with only a few retrospective/cross sectional studies. We could not come across any published data on the prevalence of this condition in the Indian subcontinent.

PUBS has been reported to often occur in chronically catheterized and constipated patients, especially women who have significant disability (bed bound or chair bound), have underlying comorbidities and cognitive impairment. Other risk factors include old age, alkaline pH of urine, institutionalization of the patients, and the use of plastic urinary catheter and bag.[5,6] In our case, female gender, old age, cognitive impairment, history of constipation, alkaline urine, and the use of plastic urine bag were the risk factors for PUBS. However, our patient was home cared and was not a nursing home resident.

It is noteworthy that despite the frequent occurrence of UTIs in patients with risk factors for PUBS, the condition is infrequently encountered in clinical practice.[7] According to Pillai *et al.*, it could be because of the fact that simultaneous presence of multiple risk factors may be the prerequisite for development of PUBS.[8] For instance in addition to being catheterized, the presence of urinary tract infection caused by sulphatase- and phosphatase-producing bacteria as well as the presence of high tryptophan in the diet for the formations of the essential pigments may be required. It has been shown that not all the bacteria of the same species can produce phosphatase and sulphatase, the enzymes required for the formation of the responsible pigments.[9-11] Or it could be due to the fact that the pigment quantity is not sufficient to produce the discoloration.

Thorough literature review reveals that the most common bacteria associated with PUBS include *Providencia stuartii*, *Providencia rettgeri*, *Klebsiella pneumoniae*, Proteus species, *Escherichia coli*, Enterococcus species, *Morganella morganii*, and *Pseudomonas aeruginosa*.[4,9,12] Less commonly reported associations include *Citrobacter spp*., *Staphylococcus spp*. *Streptococcus spp*. and even Methicillin-resistent *Staphylococcus aureus.*

It has been observed that constipation and intestinal obstruction are strongly associated with PUBS.[6,10] Chronic constipation alters gut motility and intestinal bacterial flora. Normal bacterial flora containing tryptophase converts dietary tryptophan to indole, pyruvic acid, and ammonia.[8,13] Indole is absorbed rapidly to the portal circulation and it is then converted into indoxyl sulphate in the liver. Most indoxyl sulphate is excreted into the urine and digested into indoxyl by indoxyl sulphatase produced by some bacteria. Indoxyl turns into indigo (blue color) and indirubin (red color) in alkaline urine, and these colors then mix to form a purple color.[4,12,14] It has been described in the literature that intestinal conditions like intestinal obstruction, intussusception and illeal diversions can also precipitate the PUBS.[8,15]

Although an alkaline urine is an important factor for the phenomenon of PUBS as observed in most of the studies,[3,4,16,17] some studies have reported PUBS even in acidic urine pH.[18,19]

Thorough literature review suggests that PUBS per se appears to be a benign process without major consequences,[20] and most of the patients are asymptomatic. Therefore, some authors have a consensus that only changing the urinary catheter and urinary bag usually are enough to solve the problem.[19] Aggressive investigation and treatment like routine antibiotics, and extensive work up including urine culture are usually not necessary. Urine cultures and antibiotic therapy are considered only for those who are symptomatic,

suggestive of an underlying UTI. For asymptomatic patients, treatment should be aimed at the underlying medical problem rather than purple bag itself, and to reduce likelihood of this problem, it is important that the drainage bags and indwelling long-term catheters may need to be changed on a more regular basis.

Interestingly, recurrences of purple discoloration of the urine bag may be seen if the urine bag is changed prior to the complete resolution of UTI. Before coming to us, our patient was probably not treated adequately with proper antibiotic therapy, and therefore she was having recurrence of the symptoms as well as the purple discoloration. We treated her with appropriate antibiotic therapy for 10 days as indicated for a complicated UTI and she has not had recurrence to date.

Conclusion

PUBS is an infrequent manifestation of urinary tract infection mostly seen in chronically catheterized, constipated elderly women. Its clinical course is usually benign and harmless without any serious consequences. Improvement in the care of urinary catheters prevents both PUBS and catheter associated urinary tract infection.

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