

Purple urine bag syndrome: A startling phenomenon of purple urine in a urine drainage bag. A primary care approach and literature review

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Abstract

Purple urine bag syndrome (PUBs) is a rare and startling phenomenon of purple discoloration in the urine or urinary catheter and bag. It is reported in chronically debilitated elderly patients, mostly in women on long-term urinary catheters. Its prevalence is strikingly more common in nursing home residents. Several factors contribute to the formation of indigo (blue) and indirubin (red) pigments from a breakdown of dietary tryptophan, which stains the urine purple. These factors include constipation, dysmotility of the bowel, bowel bacterial overgrowth, dehydration, and urinary tract infection. The presence of purple urine may cause undue alarm to both the patient and the doctor. Thus, we present this case report on an 86-year-old woman, a nursing home resident on a long-term urinary catheter, who presented to the primary care clinic. Her urine cleared after antibiotic therapy, replacement of her urinary catheter, and supportive management, which included hydration and nutrition. In addition to these measures, reducing the time between urinary catheter changes was recommended to prevent recurrence of this condition.

Introduction

Purple urine bag syndrome (PUBs) is an interestingly startling and rare phenomenon of purple discoloration of the urine, catheter, and urine bag which was first reported by Barlow and Dickson in 1978.¹ In Malaysia, PUBs have been reported in patients presenting to secondary care settings.^{2,3} This purple hue may be alarming to the patient, family and even to the medical practitioner. For most patients, this condition may be managed in the primary care setting. It is associated with chronically debilitated, elderly patients who are on long term catheters. Several factors contribute to the formation of indigo (blue) and red indirubin(red) pigments from the breakdown of dietary tryptophan. These factors include constipation, dysmotility of the bowel, bowel bacterial overgrowth, dehydration and urinary tract infection. Its pathogenesis is outlined in **Table 1**. Alkaline urine is another feature of this condition, along with a concurrent urinary tract infection. While a urinary tract infection is a common condition seen in primary care, PUBs is rarely encountered, resulting in alarm in many of the physicians who encounter the

condition. Thus, this case report highlights the condition and primary care approach to managing this rather benign condition.

Case Report

An 86-year-old woman, who is a nursing home resident, was brought in to the primary care clinic in December 2016 by her sister with complaints of purple discoloration of urine, catheter, and urinary bag for two months. The patient's sister had been informed by the nursing home caregiver regarding the patient's foul-smelling, purple urine a few weeks earlier; however, she delayed in bringing the patient to the clinic due to her poor health.

The patient had been on a long-term silicon urinary catheter since May 2015. In May 2015, she was admitted for uterine prolapse and developed acute urinary retention secondary to a urinary tract infection. She was subsequently discharged to a nursing home with a urinary catheter, which was changed every 6 weeks.

During the first clinic visit, she was asymptomatic of urinary tract infection, with

no history of pain at the tip of the urethra, hematuria, or fever. However, her sister reported the history of foul-smelling urine as indicated to her by the nursing home caregiver. Her last urinary catheter change had been 5 weeks ago. She was well-hydrated and drank approximately 500 ml of water every 2 hours and did not have history of altered bowel habits. Her diet included 5 meals in a day, which consisted of biscuits, rice, chicken, and fish. She was semi-dependent in her daily activities and ambulated with a walking frame. Other geriatric assessment revealed progressive memory loss for the past 1 year.

On examination, she was afebrile with a temperature of 36.6 degrees Celsius. Her blood pressure was 130/100 mmHg, and her pulse rate was 74/minute. She was well hydrated with good pulse volume and capillary refill time of less than 2 seconds. Her mini mental scale examination (MMSE) was 11/30. She was orientated to people but not to time and place. However, she was alert and cooperative. Her abdomen and other systemic examinations were unremarkable.

Her laboratory investigation revealed urinalysis results of PH 8, leucocyte 3+, protein 2+, nitrite negative, ketone negative, haemoglobin 5+ and specific gravity 1.01. No baseline full blood count or other blood investigations were taken in view of the patient not being septic. However, urine was sent to the lab for culture and sensitivity.

The patient was treated empirically for urinary tract infection with oral cefuroxime 500mg twice a day for 1 week. It was arranged to have her silicon urinary catheter changed on the same day, and instructions were given to reduce the time between changes of the silicon urinary catheter to 4 weeks, thereafter. Her sister was advised to keep her well-hydrated, and maintain good nutrition.

She came back to the clinic for follow-up 2 weeks later, and her sister reported that her urine colour had normalized from the point of her last urinary catheter change. Her urine culture and sensitivity report came back as mixed growth. She remained well and did not have symptoms of urinary tract infection or recurrent purple discoloration of urine. She was referred to a geriatrics memory clinic for her deterioration in cognitive function. With the patient's and her sister's consent, a telephone call was made to her caregiver at the

nursing home to explain her general condition and necessary supportive measures of adequate hydration, good nutrition, and avoiding constipation. The duration of use of each catheter, shortened to 4 weeks, was explained to her caregiver as well.

Discussion

The incidence of PUBs and its association with urinary tract infection in elderly and chronically catheterized patients is evident in a study done at a community hospital in Taipei on 157 patients with urinary catheters, 13 of whom exhibited PUBs. Of the 13 affected patients, 11 were women, and 2 were men.⁴ This points to its association largely with elderly females. The study also concluded that a majority of patients with PUBs lived in nursing homes as compared to those with urinary tract infections without PUBs with prevalence rates of 67.2% and 43.1%, respectively. Interestingly, 12 out of the 13 patients with PUBS reported that their urine was alkaline with a PH of equal to greater than 7. This study also indicated that being bedridden, having Alzheimer's disease, and having dementia were risk factors for PUBs likely, due to the poor self-care and hygiene.⁴

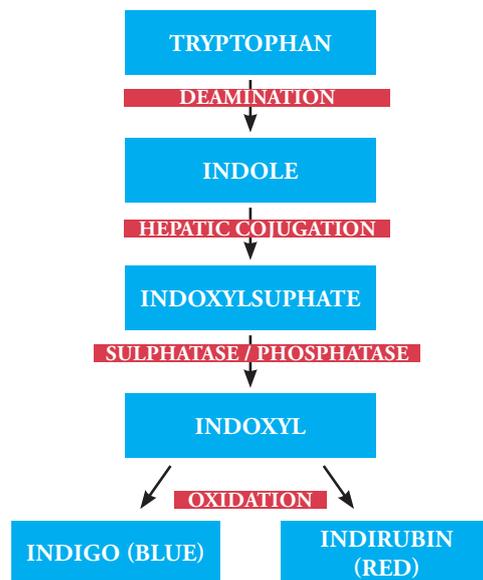
The major risk factors associated with the conversion of dietary tryptophan into the end products of indigo (blue) and indirubin (red) pigment are having a tryptophan diet, chronic constipation, a chronic indwelling catheter, a high bacterial load in urine, alkaline urine, and renal failure.⁵ The biochemical pathway to the breakdown of tryptophan into the indigo and indirubin pigments is outlined in **Figure 1**.

The rarity of PUBs could be questioned as there are under reported cases, and physicians, in general, have little exposure to and experience in managing it. Another case study on 10 elderly patients with PUBs in two nursing homes in Taiwan reported that 19 out of the 74 residents in these two nursing homes had a Foley catheterization. Out of those who were catheterized, the prevalence of PUBs was 42.1%. Of the residents with PUBS, 10 had been catheterized for at least 12 months. A significant number, i.e., 8 out of 10 of these residents, reported a positive urine culture, which points towards its association with urinary tract infection.⁶

The outline for management of PUBs is directed at treating the urinary infection, good urologic sanitation and control of constipation.⁵ Thus,

in this case report, the patient was treated empirically with cefuroxime for urinary tract infection and her urinary catheter changed. In addition, the time each silicon catheter was used was shortened to prevent further recurrence of this condition. Other supportive measures, such as proper nutrition, adequate hydration, and sanitation were advised to further support in prevention of a recurrence.

Figure 1: Biochemical pathway of conversion of dietary tryptophan into indigo and indirubin pigments



Adapted from: Khan F et al⁵

Figure 2: Purple discoloration of the urine, urine bag and tubing.



Disclaimers

There are no disclaimers or conflicts of interests.

Consent

Informed consent has been obtained from the patient and family.

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