

Two cases of the purple urine bag syndrome

兩個紫尿袋綜合徵的個案

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The purple urine bag syndrome, purple discoloration of urine, is an uncommon and alarming condition in patients requiring long-term urinary catheterization but the clinical course is usually benign. We report two cases of the syndrome with a literature review on its aetiology and management. (*Hong Kong j.emerg.med.* 2009;16:155-158)

紫尿袋綜合徵（尿液變紫色）是不常見及嚇人的情況，見於需要長期使用尿導管的病人，但臨床過程通常是良性的。我們報告兩個紫尿袋綜合徵的個案，並在文獻中複審其成因及處理。

Keywords: Purple urine bag syndrome, urinary catheterization

關鍵詞：紫尿袋綜合徵、插尿管

Introduction

The complications associated with chronic urinary catheterization, namely urinary tract infection and blockage, are common conditions presenting to the emergency department (ED). The purple urine bag syndrome (PUBS), purple discoloration of the urine in the urinary catheter and collecting bag, is an uncommon condition. It is usually a benign condition but its appearance is alarming to patients and caretakers. The literature on its aetiology and management is reviewed.

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Case 1

An 85-year-old lady, with history of ischemic heart disease, dementia and stroke resulting in a debilitating state requiring long-term usage of urinary catheter, presented to the ED in June 2007 for purple discoloration of urine in the urinary catheter and bag for two days.

On physical examination, she was afebrile with normal vital signs. Purplish coloured urine was noticed in her urinary catheter and collecting bag (Figure 1). The diagnosis of PUBS was made. The patient was discharged home after changing the urinary catheter and urine bag. She did not have any further episodes of PUBS.

Case 2

A 91-year-old bedridden female nursing home resident, with a history of stroke and delusional disorder requiring long-term urinary catheterization, was



Figure 1. The light purplish discoloration of urine in the urine bag and Foley catheter in Case 1.

brought to the ED in September 2008 because of purple discoloration of urine in the urinary collecting bag for two days (Figure 2).

The physical examination revealed an incommunicable elderly patient in a debilitating state with normal vital signs. She was afebrile. The urinary catheter and collecting bag were stained with purplish-coloured urine. Her urine was saved for Multistix test, routine microscopic examination and culture. The dipstick urinalysis showed positive results for leukocyte esterase and nitrite. Her urine pH was 6.0. She was discharged after urinary catheter change with a course of antibiotic. The urine culture grew *Escherichia coli*. She did not have any further episodes of PUBS.

Discussion

The PUBS was first described by Barlow and Dickson in 1978,¹ purple urine being found in a patient who had long-term urinary catheterization. The syndrome is characterised by purple discoloration of the urine, collecting bag, and tubing. The prevalence rates of PUBS ranged from 8.3%² to 16.7%³ in different studies. In a Taiwan study, up to 42.1% of the patients with Foley catheterization developed PUBS in a half-year period of follow-up.⁴ However, no local data could be found in previous literature. PUBS occurs predominantly in elderly women who are bedridden, chronically catheterized and constipated.^{5,6}

Urine colour can change for many reasons. The ingestion of certain food or medications can result in changes in urine colour, for example, red urine in patients exposed to beetroot, rifampicin or metronidazole, and blue urine in patients exposed to methylene blue.^{5,7} *Pseudomonas* urinary tract infection can result in green urine.⁸



Figure 2. Deep purplish discoloration of urine in the urine bag in Case 2.

Our literature review indicates that there are a number of bacteria commonly associated with the PUBS, namely *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter agglomerans*, *Pseudomonas aeruginosa*, *Proteus* species, *Providencia* species, *Enterococcus* species and *Streptococcus faecalis*.^{3-6,9}

There are several risk factors predisposing patients to the development of the PUBS, such as advanced age, female gender, being bedridden, constipation, chronic urinary catheterization, urinary tract infection, alkaline urine and the use of plastic catheters.³⁻⁶

The aetiology of the PUBS is believed to be related to tryptophan, an essential amino acid in the human diet. The normal flora in the intestine metabolises tryptophan to indole which is absorbed into the portal circulation via the gut wall. Liver conjugates indole into indoxyl sulphate which is excreted in the urine. Urinary bacteria (if present) produce the enzyme indoxyl sulphatase/phosphatase, breaking down the indoxyl sulphate into indoxyl. Then indoxyl turns into indigo (blue in colour) or indirubin (red in colour). The mixture of these two substances produces purple urine in the urinary catheter and urinary bag (Figure 3).^{5,9-11}

Chronic constipation is commonly seen in bedridden elderly. The reduced gut motility and prolonged transit time result in bacterial overgrowth in the colon, thus increasing the conversion of tryptophan into indole.³ Besides, long-term indwelling urinary catheterization causes a higher prevalence of urinary tract infection, particularly in females, which may promote the conversion of indoxyl sulphate into indoxyl. That is why patients of the PUBS are often elderly women with constipation and chronic urinary catheterization. Other intestinal conditions like intestinal obstruction,¹ intussusception¹² and ileal diversions¹³ can also precipitate the PUBS.

The urine pH found in most of the PUBS cases are alkaline, so some authors have suggested that alkaline urine is an important factor of the PUBS.^{2,3,6,9,10,14,15} Bar-Or et al¹¹ reported a patient with slightly acidic urine (pH 6-6.5) and Chung et al¹⁶ reported a patient with acidic urine (pH 5.5) suffering from the PUBS.

These cases are similar to our Case 2, whose urine pH was 6. Therefore, an alkaline environment, a favourable factor for the growth of the contributory bacteria with enzyme activities for the oxidation of indoxyl, is not a must for purple urine to develop.

Almost all patients presenting with the PUBS are asymptomatic. Its clinical course is usually benign and harmless without any sequelae.^{3,9,17,18} The PUBS is not a harmful condition per se, nor it causes direct health problem to the patient.² Therefore, changing the urinary catheter and urinary bag usually are enough to solve the problem. Aggressive investigation and treatment like routine antibiotic, urine culture or septic work-up are usually not necessary.^{3,6,19} Antibiotic is only indicated when there is concurrent symptomatic urinary tract infection. If antibiotic is indicated, Su et al suggested ciprofloxacin should be used as first-line therapy because bacteria related to such infection expressed high resistance rate to sulfamethoxazole-trimethoprim and ampicillin.²

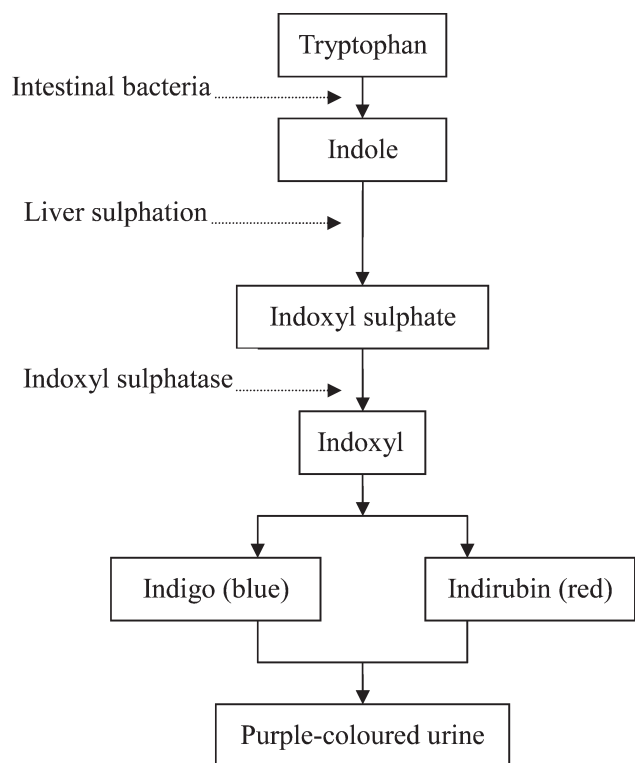


Figure 3. The formation of indigo and indirubin from tryptophan.

Conclusion

Purple discolouration of urine is alarming to both patients and caretakers. Emergency physicians should recognise this uncommon but benign condition and manage accordingly so that unnecessary investigations and treatments can be avoided.

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