PURPLE URINE BAG SYNDROME - A WARNING SIGN

Chang-Min Hsu¹, Shi-Jye Chu²

Abstract

The purple urine bag syndrome is a condition characterized by the purple discoloration of the collecting bag and tubing. The metabolites of tryptophan (indigo and indirubin pigments) cause discoloration. Repeated urinary tract infections with bacteria containing sulphatase and phosphatase enzymes are implicated in the development of these pigments. Most reports consider that this phenomenon is benign. However, caution is needed, because many cases have progressed to severe disease states. Therefore, purple urine bag syndrome may be related to higher morbidity and mortality. Here, we present a case of purple urine bag syndrome occurring in an 86-year-old woman who expired shortly in spite of intensive medical treatment after admission.

Key Words: Purple urine bag syndrome, urinary tract infection, tryptophan

Introduction

The purple urine bag syndrome (PUBS) is a phenomenon that defines the purple discoloration of the urinary collecting bag and tubing. According to previous reports, PUBS occurs mostly in elderly bedridden women with chronic catheterization and constipation.¹ This condition is often complicated with urinary tract infection (UTI).² The discoloration of urinary drainage bags is considered due to the presence of indigo and indirubin pigments which precipitate in the catheter and urinary bag, and consequently turn purple.³ We report a case of PUBS occurring in an 86-year-old chronic bed-ridden female. She died quickly in spite of intensive medical treatment.

Case Presentation

A 86-year-old female was chronically debilitated, and a nursing home resident with a past medical history of hypertension, diabetes mellitus, brain tumor surgery, stage III pressure sore, and constipation. She was living nursing home for several years and required for a chronic indwelling urinary catheter. The patient was presented to the emergency department because she was found to have fever and shortness of breath for one day. Upon arrival to the emergency department, purple discoloration of the urine bag and tubing was found (Fig. 1). After reviewing her medications, no pharmacological agent that could cause urine discoloration was noticed.

On physical examination, her respiratory rate was 30 breaths per minute, the pulse 143 beats per minute, the temperature 38.3°C, blood pressure
83/42 mmHg, and the oxygen saturation 98% while the patient was using ambient air. Generally, she appeared acute ill-looking and lethargic. Examination of the head and neck revealed no abnormalities. Sacral region showed stage III pressure sore. The results of pulmonary, cardiac, and abdominal examinations were unremarkable.

She had a white blood cell count of 9.2 x 10^3/ul with neutrophilia, and elevated C-reactive protein of 23.6 mg/dl. Her urinary analysis showed a pH of 7.0, too numerous to count white blood cells per high power field, red blood cells 16 to 25 per high power field, and marked bacteria. Chest radiographs showed increased infiltration over right lung field. A diagnosis of severe sepsis secondary to pneumonia and UTI was made.

Blood cultures isolated Bacteroides fragilis and Streptococcus constellatus. The culture of urine grew Escherichia coli and Proteus mirabilis. The patient was treated with piperacillin/tazobactam for the first 3 days and then vancomycin was added according to sensitivity test. However, she died due to severe septic shock and multiple organ failure in spite of intensive medical therapy.

**Discussion**

PUBS is a condition in which the urine bags and tubing of catheterized patients became purple. The exact prevalence of PUBS is unknown. Initially PUBS is considered uncommon, but the prevalence of PUBS is variably reported in different series, such as 9.8% in Dealer’s investigation and 8.3% at a long-term care service center in a Taiwan community hospital. Furthermore, a recent report showed that the prevalence of PUBS was high to 16.7% in urinary catheterized nursing home residents. Therefore PUBS seemed not very rare. The discrepancy between different studies may be due to different nursing institutions, environmental factors such as the way of care, content of food and surrounding bacterial species, and the prevalence of chronic kidney disease. Further study is necessary to clarify the prevalence of PUBS and contribution factors that cause the difference.

The etiology of the discoloration is still not clear, but it is believed that PUBS is due to the tryptophan from food being metabolized into indole by the gut bacteria in patients with disturbed intestinal motility. Postponed gut transport lets gut bacteria to metabolize tryptophan to indole. Then the indole is absorbed into portal circulation and converts into indicant in the liver. Indicant is excreted and metabolized in the urine by bacteria containing sulphatise or phosphatase to indirubin (red color) and indigo (blue color) in an alkaline environment. When they react each other, they develop purple. The indigo forms a coating layer in the plastics of the catheter bag and tubing to generate purple discoloration. Interestingly, the change in color may be only within the bag itself; the urine itself is unaffected in color. Furthermore, the intensity of the color varies on the interaction of individual patient, bacteria, constipation (longer resorption time of tryptophan), and alkaline urine. The purple color can subside spontaneously or after...
therapy of the urinary tract infection.

In the literatures, a number of PUBS-related factors have been mentioned. Most patients with PUBS were old age, female gender, bedridden, constipation, long-term indwelling urinary catheterization, large bacterial colonies in urine, UTI, alkaline urine, nursing home residents, and plastic catheter. In our case, female gender, old age, cognitive impairment, chronic constipation, nursing home resident, and the use of plastic urine bag were the risk factors for PUBS. Furthermore, chronic kidney disease was reported as a potential risk factor in the development of PUBS. As noted before, multiple bacteria (Klebsiella pneumoniae, Providencia stuartii, Enterobacter spp., Proteus mirabilis, Morganella morganii, and Escherichia coli) have been grew in the urine, some with sulfatase and phosphatase activities but the other without it. In contrast, our case had mild acidic urine. The formation of purple discoloration depends on bacterial colony counts and the concentration of indicant. Though discoloration will develop rapidly in the alkaline urine, it is possible for this to occur in acidic urine.

The PIBS is an obviously visual effect of UTI. PUBS may be distressing for the patients, their families as well as for healthcare providers, but most patients with PUBS are asymptomatic, benign and easily treatable, and some physicians have suggested that aggressive treatment for PUBS is unnecessary. However, the underlying UTI can lead to serious consequences in a patient with a long-term urinary catheter in which the standard warning signs of dysuria and fever may not be apparent on top of other medical comorbidities. Tasi et al. reported two cases of PUBS in immunocompromised patients which progressed to Fournier’s gangrene. Hence, PUBS is not always benign. Early recognition and intervention are warranted in certain cases such as symptomatic PUBS, immunocompromised patients, history of recurrent UTIs, institutionalized patients, and in those who are not having a proper care of the urinary catheters and proper sanitation.

The treatment of PUBS should be aimed at the underlying medical problem rather than purple bag itself. Clinicians dealing with PUBS should draw immediate attention that this syndrome signals underlying recurrent UTIs due to improper care of the urinary catheters and improper sanitation. PUBS is generally associated with higher incidence of morbidity and mortality than UTI alone without this syndrome. Therefore, we advocate that PUBS is a harmless, but warning sign.

In conclusion, PUBS is a manifestation characterized by an alarming purple discoloration of the urine secondary to recurrent UTI. It is usually seen in chronically catheterized, constipated elderly women. Most PUBS is benign. But PUBS is often overlooked. Failure of early recognition of this peculiar color could delay the appropriate intervention leading to fatal complication as in our case. Our patient highlights that PUBS should be approached on a case-by-case basis because it may signal the underlying UTI which might be very difficult to treat. Further researches and large scale investigations would be helpful in PUBS to determine the high risk factors which can potentially lead to severe complication.

References

紫尿袋症候群 - 警告徵兆

許昌敏¹，朱士傑²

摘要

紫尿袋症候群是一種狀況，特徵為尿袋及尿管呈現紫色的現象。其呈現紫色是因色胺基酸的代謝產物，包括靛紅質（红色）或靛質（蓝色），混合附著尿袋而產生變色。這種病人常合併有反覆泌尿道感染。而這些色素沉澱與菌種含有硫酸酶或是磷酸酶有關。大部分報告認為紫尿袋症候群是良性，然而我們須要小心，因為很多病人進行到嚴重的疾病。因此紫尿袋症候群可能有較高的罹病率及死亡率。在此篇文章我們報告紫尿袋症候群發生在一位八十六歲女性，儘管其接受積極藥物治療，但住院後不久死亡。

關鍵詞：紫尿袋症候群，泌尿道感染，色胺基酸

通訊作者：朱士傑醫師
114 台北市內湖區成功路二段 325 號；三軍總醫院風濕免疫過敏科
電話：02-8792-7135；傳真：02-8792-7136；E-mail：d1204812@mail.ndmctsh.edu.tw
安泰醫療社團法人安泰醫院（東港）內科部