



## รายงานผู้ป่วย: กลุ่มอาการปัสสาวะในถุงมีสีม่วงในผู้ป่วยหญิงไทยนอนติดเตียง

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### A Case Report: Purple Urine-Bag Syndrome in Thai Woman with Bedridden State

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Received: 21 January 2022 /Edit: 18 February 2022 /Accepted: 1 March 2022

#### บทคัดย่อ

**หลักการและวัตถุประสงค์:** กลุ่มอาการปัสสาวะในถุงมีสีม่วง เป็นกลุ่มอาการที่พบบ่อย โดยมักพบในผู้ป่วยที่ต้องใส่สายสวนปัสสาวะเป็นเวลานาน และมีโรคติดเชื้อในทางเดินปัสสาวะร่วมด้วย รายงานผู้ป่วยฉบับนี้มีวัตถุประสงค์เพื่อทบทวนความรู้เกี่ยวกับพยาธิกำเนิด กลุ่มอาการปัสสาวะในถุงมีสีม่วง และการจัดการ

**รายงานผู้ป่วย:** ผู้ป่วยหญิงไทยอายุ 84 ปี นอนติดเตียงเข้ารับการรักษาในโรงพยาบาลเนื่องจากได้รับการวินิจฉัยว่าเป็นโรคติดเชื้อในทางเดินปัสสาวะร่วมกับมีกลุ่มอาการปัสสาวะในถุงมีสีม่วง ปัจจัยเสี่ยงของการเกิดกลุ่มอาการปัสสาวะในถุงมีสีม่วงในผู้ป่วยรายนี้ได้แก่ สูงอายุ เพศหญิง มีภาวะติดเตียง ใส่สายสวนปัสสาวะเป็นเวลานาน ท้องผูกเรื้อรัง ปัสสาวะเป็นด่าง และมีโรคติดเชื้อในทางเดินปัสสาวะ โดยบทความนี้จะกล่าวถึงกลไกการเกิดและการจัดการกลุ่มอาการดังกล่าว

**สรุป:** การมีความรู้ความเข้าใจเกี่ยวกับกลุ่มอาการปัสสาวะในถุงมีสีม่วง จะช่วยให้บุคลากรทางการแพทย์สามารถจัดการกับกลุ่มอาการดังกล่าวได้อย่างเหมาะสม และสามารถช่วยลดความตื่นตระหนกและความวิตกกังวลของผู้ป่วยและผู้ดูแลได้

**คำสำคัญ:** กลุ่มอาการปัสสาวะในถุงมีสีม่วง, ปัสสาวะสีม่วง, โรคติดเชื้อในทางเดินปัสสาวะ

#### Abstract

**Background and objectives:** Purple urine-bag syndrome (PUBS) is uncommon syndrome which can be observed in patient with long-term indwelling urinary catheter with concomitant urinary tract infection (UTI). This case report aimed to review the pathogenesis and management of PUBS.

**Case report:** An 84-year-old Thai woman with bedridden state was admitted under the diagnosis of UTI with PUBS. Her risk factors of PUBS included elderly, female gender, bedridden state, chronic catheterization, chronic constipation, alkaline urine and UTI. The mechanism of pathogenesis and management of PUBS are described.

**Conclusions:** Awareness of this rare syndrome is crucial for health care providers so as to proper management and decreasing panic or anxiety of patients and caregivers.

**Keywords:** purple urine-bag syndrome, purple urine, urinary tract infection

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## Introduction

Purple urine-bag syndrome (PUBS) is uncommon manifestation of urinary tract infection (UTI) in which patients develop purple urine in their catheter tubing and bags. It was first formally reported in 1978<sup>1</sup>. The prevalence of PUBS ranged between 8.3% and 42.1% among patients with long-term indwelling catheters with concomitant UTI<sup>2,4</sup>. In Thailand, PUBS remains unusual. A few case reports were revealed in the elderly patients with bedridden and catheter-associated UTI<sup>5,6</sup>. Frequently, the purple urine can cause alarm for patients, caregivers and some health care workers who unacquainted with such event. Accordingly, the mechanism of pathogenesis and management of PUBS should be recognized.

## Case presentation

An 84-year-old Thai bedridden woman with chief complaint of lower abdominal pain, low-grade fever and purple urine discoloration for 1 day was admitted to community hospital on 21 November 2019. Her underlying diseases were hypertension and dyslipidemia controlled by daily amlodipine 5 mg and simvastatin 10 mg, respectively. She had urinary catheterization for 1 year because of unable urination. On admission, body temperature of 37.8 °C, blood pressure of 140/80 mmHg, pulse rate of 92 beats per minute (bpm) and respiratory rate of 20 bpm were detected. Physical examination did not indicate any abnormal signs. A complete blood count revealed a leukocytosis at 10,930 cells/mm<sup>3</sup> (normal range 4,500-10,000 cells/mm<sup>3</sup>) with absolute neutrophil count at 8,525 cells/mm<sup>3</sup> (normal range 2,250-7,000 cells/mm<sup>3</sup>). Serum electrolytes, blood urea nitrogen, and serum creatinine were all within normal ranges. Her urinalysis produced purple urine (Figure 1) and slightly turbid with a pH of 8.0, a specific gravity of 1.010, urine blood of 2+, and negative for glucose and ketone. Urine microscopy showed WBC of 5-10 cells/high power field (HPF) and RBC of 3-5 cells/HPF. She was admitted under the diagnosis of UTI with PUBS. This patient was empirically started on intravenous injection of cefotaxime 2 g every 8 hours. Paracetamol 500 mg every 4-6 hours and hyoscine 10 mg every 6 hours were given as needed for fever and lower abdominal pain, respectively. The catheter and plastic bag were also changed. On 22 November 2019, urine culture results yielded 10<sup>4</sup> - 10<sup>5</sup> colony forming units (CFU)/ml of *Klebsiella pneumoniae* and 10<sup>4</sup> - 10<sup>5</sup> CFU/ml of *Proteus mirabilis* and blood culture indicated 10<sup>4</sup> - 10<sup>5</sup> CFU/ml of *Proteus mirabilis*. Antibiotic sensitivity tests of urine and blood cultures showed susceptible to cefotaxime, ceftriaxone, ceftazidime and cotrimoxazole. Her practitioner

had continued cefotaxime in the same regimen. Lactulose and senna were given as needed for her chronic constipation. The purple urine disappeared and the following urinalysis was sterile. She was discharged in stable condition after 14 days of antibiotic treatment.

## Discussion

There are several risk factors associated with PUBS including elderly, female gender, immobility, chronic catheterization, chronic constipation, increased dietary tryptophan, increased urine alkalinity, high urinary bacterial loads or UTI and renal disease<sup>3,5,7-9</sup>. Various organisms have been reported in the urine of patients with PUBS including *Klebsiella pneumoniae*, *Proteus mirabilis*, *Morganella morganii*, *Escherichia coli*, *Providencia* species, *Citrobacter* species, *Enterococcus* species, and *Pseudomonas aeruginosa*<sup>2,3,6,7</sup>. In this case, risk factors were her age (84 years), female gender, bedridden state, chronic catheterization (1 year), chronic constipation, alkaline urine and UTI. Her urine and blood cultures indicated the presence of *Klebsiella pneumoniae*, and *Proteus mirabilis* which compatible with PUBS.

The mechanism of developed purple urine initiate from tryptophan metabolism in gastrointestinal tract. Dietary tryptophan is metabolized to indole by gut microbiota, indole is then absorbed into the portal venous system and later conjugated to indoxyl sulfate in the liver. Subsequently, indoxyl sulfate or indican is excreted into the urine and indican is converted by urinary bacteria that produce sulphatases or phosphatases to get indoxyl. In urine, indoxyl is converted to indigo (blue pigment) and indirubin (red pigment). Oxidation of indican is facilitated by an alkaline urine<sup>2,4</sup>. The interactions between these pigments within plastic urine bag or catheter leads to PUBS (Figure 2). This change occurs only in the urine bag and catheter, while the color of urine does not actually change to purple<sup>8</sup>.

PUBS is usually found in the geriatric population because of the higher incidence of immobility or bedridden state. It is more predominant among female owing to the shorter urethral length and urethral proximity to the anus. Immobility leads to decreased colonic motility, precipitated constipation and increased bacterial overgrowth. Chronic constipation prolongs bowel transit time and potentiates tryptophan metabolism leading to elevated urinary indole<sup>2,7</sup>. Chronic catheterization is known to be increase UTI risk and also associated with PUBS risk. The presence of alkaline urine facilitates the process of sulphatase and phosphatase enzyme activities<sup>2,4,8</sup>. Even though alkaline urine has been mentioned to be a risk factor of PUBS, it has also been found in patient with acidic urine<sup>10</sup>.



Figure 1 purple urine discoloration in plastic urine bag and tube

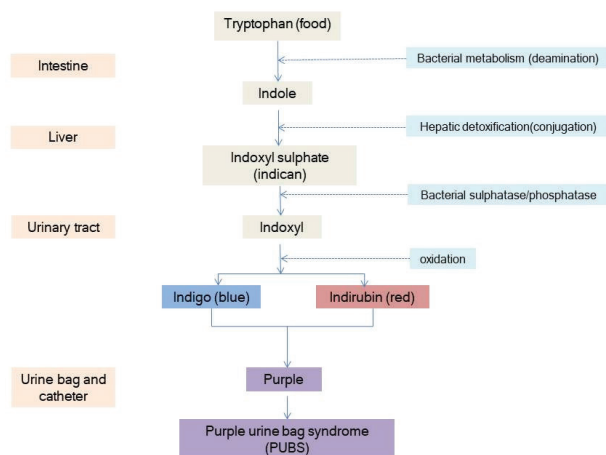


Figure 2 Tryptophan metabolism and pathogenesis of PUBS (adapted from Kalsi et, al<sup>7</sup>)

The management of PUBS involves controlling modifiable risk factors such as replacement of catheter for removing biofilm containing bacteria, giving laxatives for chronic constipation and providing antibiotic treatment for eradication of causative microorganisms<sup>3-5</sup>. Furthermore, patient and caregiver education and counseling are necessary for proper sanitation and care to decrease morbidity and mortality rates of PUBS, especially in immunocompromised patients.

The first case report in this community hospital in Thailand could be useful for clinical management of PUBS by medical staff. However, the limitation of this study is lack of follow-up after patient discharge.

## Conclusions

PUBS is uncommon condition and associated with significant anxiety of the patients and caregivers. Appropriate management includes controlling modifiable risk factors and providing antibiotic therapy according to causative microbes. Understanding of this syndrome is important for health care providers to adequate management and reducing anxiety of patients and caregivers.

## Acknowledgements

The authors would like to thank the patient who participated in this case report, and the medical staff for providing access to their patient at the Ongkharak Hospital, Nakhonnayok, Thailand.

## References

1. Barlow GB, Dickan JAS. Purple urine bags. Lancet 1978;311:220-1.
2. Dealler SF, Hawkey PM, Millar MR. Enzymatic degradation of urinary indoxyl sulfate by *Providencia stuartii* and *Klebsiella pneumonia* causes the purple urine bag syndrome. J Clin Microbiol 1988;26:2152-6.
3. Su FH, Chung SY, Chen MH, Sheng ML, Chen CH, Chen YJ, et al. Case analysis of purple urine-bag syndrome at a long-term care service in a community hospital. Chang Gung Med J 2005;28:636-42.
4. Lin CH, Huang HT, Chien CC, Tzeng DS, Lung FW. Purple urine bag syndrome in nursing homes: ten elderly case reports and a literature review. Clin Interv Aging 2008;3:729-34.
5. Laoopugsin S, Laoopugsin N, Subsuebwong T, Purple urine bag syndrome (PUBS): warning sign for urinary tract infection in patients with urinary catheterization. J Public Health Nurs 2018;32:166-77.
6. Tanratana P, Jiaranaikulwanich A. A 95-year-old male with purple urine. J Infect Dis Antimicrob Agents 2019;36:135-7.
7. Kalsi DS, Ward J, Lee R, Handa A. Purple urine bag syndrome: a rare spot diagnosis. Hindawi Dis Markers 2017;2017:9131872.
8. Peters P, Merlo J, Beech N, Giles C, Boon B, Parker B, et al. The purple urine bag syndrome: a visually striking side effect of a highly alkaline urinary tract infection. Can Urol Assoc J 2011;5:233-4.
9. Sabanis N, Paschou E, Papanikolaou P, Zagkotsis G. Purple urine bag syndrome: more than eyes can see. Curr Urol 2019;13:125-32.
10. Chung SD, Liao CH, Sun HD. Purple urine bag syndrome with acidic urine. Int J Infect Dis 2008;12:526-7.