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Clinical Case

Purple urine bag syndrome in primary healthcare: a case report

Síndrome da bolsa de urina roxa na atenção primária: relato de caso

Síndrome de la bolsa de orina púrpura en atención primaria de salud: informe de caso

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Abstract

Introduction: Purple urine bag syndrome is an uncommon clinical presentation of urinary tract infection. It is characterized by the purple coloration of urine resulting from the metabolism of tryptophan to indole and subsequent conversion to indoxyl and formation of pigments by bacteria present in the urine. The bacterial agents commonly involved are: *Escherichia coli, Enterococcus* species, among others. The main associated risk factors are: Female sex, chronic catheterization and high urinary bacterial load. **Case presentation:** Woman, 65 years old, bedridden with multiple comorbidities, including chronic constipation, presented a purplish coloration in the collection bag of an indwelling urinary catheter (IUC). Urine tests showed the formation of colonies of *Acinetobacter baumannii complex/haemolyticus*. She was treated with Ciprofloxacin and the IVC was replaced to address the constipation and subsequently resolve the condition. **Conclusions:** Therefore, the approach to the syndrome includes resolving the infectious condition, changing indwelling catheters and modifying risk factors that may be involved in the condition.

Keywords: Primary health care; Catheters, indwelling; Urinary tract infections; Catheter-related infections; Case reports.

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Resumo

Introdução: A síndrome da bolsa de urina roxa é uma apresentação clínica incomum de infecção do trato urinário. Caracteriza-se pela coloração arroxeada da urina decorrente da metabolização do triptofano em indol e posterior conversão em indoxil e formação de pigmentos pelas bactérias presentes na urina. Os agentes bacterianos comumente envolvidos são: *Escherichia coli*, espécies de *Enterococcus*, entre outros. Os principais fatores de risco associados são: sexo feminino, cateterismo crônico e alta carga bacteriana urinária. **Apresentação do caso:** Mulher, 65 anos, acamada com múltiplas comorbidades, entre elas constipação crônica, apresentou coloração arroxeada em saco coletor de sonda vesical de demora. Os exames de urina exibiram a formação de colônias de *Acinetobacter baumannii complex/haemolyticus*. A paciente foi tratada com ciprofloxacino, e houve troca da sonda vesical de demora com abordagem da constipação e posteriormente com resolução do quadro. **Conclusões:** A abordagem da síndrome inclui a resolução do quadro infeccioso, a troca dos cateteres de demora e a modificação de fatores de risco que podem estar envolvidos com o quadro.

Palavras-chave: Atenção primária à saúde; Cateteres de demora; Infecções urinárias; Infecções relacionadas a cateter; Relatos de casos.

Resumen

Introducción: El síndrome de la bolsa de orina púrpura es una presentación clínica poco común de infección del tracto urinario. Se caracteriza por la coloración púrpura de la orina resultante de la metabolización del triptófano en indol y posterior conversión en indoxilo y formación de pigmentos por bacterias presentes en la orina. Los agentes bacterianos comúnmente involucrados son: *Escherichia coli,* especies de *Enterococcus*, entre otros. Los principales factores de riesgo asociados son: sexo femenino, cateterismo crónico y elevada carga bacteriana urinaria. **Presentación del caso:** Mujer de 65 años, en cama con múltiples comorbilidades, incluyendo estreñimiento crónico, presentó una coloración violácea en la bolsa colectora de un catéter urinario permanente (CCV). Los análisis de orina mostraron la formación de colonias del complejo *Acinetobacter baumannii/haemolyticus*. La trataron con ciprofloxacino y le reemplazaron el dispositivo de drenaje vesical para abordar el estreñimiento y posteriormente resolver la afección. **Conclusiones:** Por tanto, el abordaje del síndrome incluye la resolución del cuadro infeccioso, el cambio de catéteres permanentes y la modificación de los factores de riesgo que puedan estar implicados en el cuadro.

Palabras clave: Atención primaria de salud; Catéteres de permanencia; Infecciones urinarias; Infecciones relacionadas con catéteres; Informes de casos.

INTRODUCTION

Urinary tract infections (UTIs) are a frequent cause of primary health care (PHC) visits and account for 13.3% of antibiotic prescriptions during consultations.[1]

One of the forms of presentation of UTIs is catheter-associated urinary tract infections. In this group, the incidence of UTI cases ranges from about 3.1 to 7.4 per 1,000 catheters/day.[2] Although chronic catheterization is more common in hospital settings, it is also a condition that can be managed on an outpatient basis in PHC, despite the prevalence of indwelling urinary catheter (IUC) use in primary care still being unknown.

Approximately 9.8% of UTIs associated with prolonged use of IUC present with an unusual clinical manifestation known as purple bag syndrome (PUBS).[3] This condition is characterized by a change in urine color from normal to purple due to contact between the urine and bacteria in the collection system, secondary to UTI. PUBS is a rare manifestation observed in patients with predisposing risk factors, including female gender, increased dietary intake of tryptophan, alkaline urine, constipation, chronic use of indwelling urinary catheters, high bacterial load in the urine, and renal failure.[3,4]

Although the condition usually follows a benign course, it is associated with recurrent UTIs and increased morbidity and mortality compared with UTIs without this manifestation.[5] This highlights the importance of recognizing the condition in PHC to ensure appropriate management and to reduce the risk of complications in affected patients

This report describes the case of a patient with multiple comorbidities, monitored by a primary health care unit team, who developed a rare UTI presenting as purple urine bag syndrome, for which treatment was successfully instituted, resulting in resolution of the condition

CASE PRESENTATION

A 65-year-old female patient, predominantly bedridden due to paraplegia, was evaluated during a home visit for a general clinical assessment

The patient had a diagnosis of hypertension (Losartan 50 mg, once a day, associated with Hydrochlorothiazide 25 mg, once a day in the morning) and anxiety (Amitriptyline 25 mg at night). She had a history of multiple pressure ulcers and had received several classes of antibiotics for associated infections. In addition, she reported chronic back pain (Gabapentin 300 mg, every 8 hours, associated with Cyclobenzaprine 5 mg every 12 hours, and Paracetamol 500 mg + Codeine 30 mg, every 6 hours, as needed for severe pain). She also experienced frequent episodes of constipation (Lactulose 667 mg/mL, 10 mL daily until bowel movements were achieved during episodes of constipation).

At present, the patient uses geriatric diapers and an IUC, which is replaced monthly.

During the visit, the patient's caregiver reported a change in the color of the urine in the collection bag (Figure 1). The health care team observed that the urine appeared purple throughout the urethral catheter and within the collection bag; however, once removed from the reservoir, it returned to a light-yellow color.

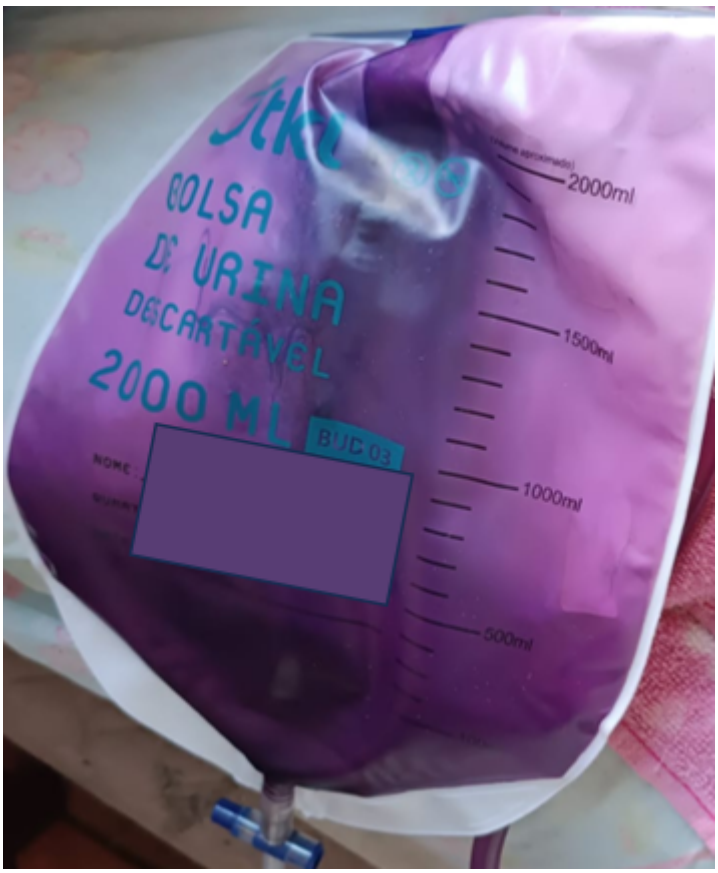


Figure 1. Purple urine in a collection bag.

On physical examination, the patient was lucid and oriented in time and space, with normal hydration status, flushed appearance, and no signs of jaundice, cyanosis, or fever, blood pressure=90/60 mmHg, heart rate=100 bpm, oxygen saturation=95% on room air, axillary temperature=36.3°C (309.45 K), and capillary blood glucose=88 mg/dL (4.88 mmol/L). Cardiac and pulmonary auscultation revealed no abnormalities. Giordano's sign was absent. No other notable findings were observed.

Given the suspicion of an atypical UTI, a partial urine sample was collected for urine culture and antibiogram analysis.

Laboratory tests revealed light yellow urine with a pH of 5.5, positive nitrites, hemoglobin (+/3+), 6,400/mL epithelial cells, and 284,000/mL leukocytes. Gram staining showed Gram-negative bacilli (+++/3+). Urine culture demonstrated growth of *Acinetobacter baumannii complex/haemolyticus* exceeding 100,000 CFU/mL. The isolate was sensitive to Amikacin (minimum inhibitory concentration — MIC≤8), Ciprofloxacin (MIC-0.25, if increased exposure), Gentamicin (MIC≤2), Imipenem (MIC≤2), Levofloxacin (MIC-1, if increased exposure), and Meropenem (MIC≤0.12), and resistant to Sulfamethoxazole + Trimethoprim and Tobramycin. No other laboratory abnormalities were observed.

Based on these results, the UTI was confirmed, presenting as PUBS.

Ciprofloxacin 500 mg was prescribed every 12/12 h for seven days, and the IUC was replaced. The patient was also advised on proper collection bag hygiene, frequent repositioning, adequate hydration, and a balanced diet to prevent constipation.

At a follow-up consultation, the condition had resolved.

Written informed consent was obtained from the patient described in this case via the Informed Consent Form. The study was approved by the Research Ethics Committee of Centro Universitário de Pato Branco, under Certificate of Presentation of Ethical Appreciation [82051824.0.0000.9727], in accordance with National Health Council Resolution No. 466, dated December 12, 2012. All procedures were conducted in accordance with the Declaration of Helsinki (1975), as revised in 2013.

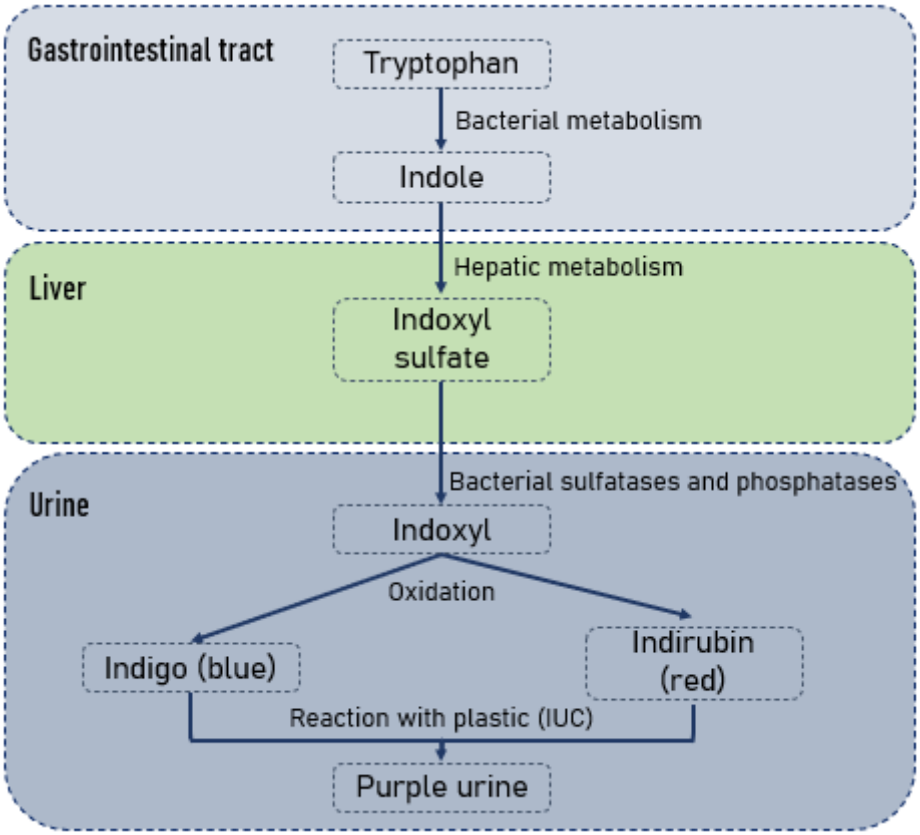
DISCUSSION

Purple urine bag syndrome is an uncommon clinical manifestation of either symptomatic urinary tract infection or asymptomatic bacteriuria, characterized by purple discoloration of the urine observed exclusively in IUC.[3]

The discoloration results from the metabolism of tryptophan into indole by the gastrointestinal bacterial flora. After passing through enterohepatic circulation, indole is conjugated into indoxyl sulfate, which is excreted in the urine and converted to indoxyl by bacterial sulfatases and phosphatases present in UTIs. Oxidation of indoxyl produces two pigments: indigo and indirubin, which are blue and red, respectively. The combination of these pigments, along with contact with the plastic of the IUC, produces the characteristic purple coloration observed in PUBS,[4] as illustrated in Figure 2.

It is important to note that not all bacteria are capable of causing PUBS.[4] The bacterial species most commonly implicated include *Escherichia coli*, *Enterococcus* spp., *Klebsiella pneumoniae*, *Morganella morganii*, *Pseudomonas aeruginosa*, *Citrobacter spp*., *Staphylococcus spp*., and *Streptococcus spp*.[5]

In addition to bacterial presence in the urine, risk factors involved in the pathogenesis of tryptophan metabolism leading to purple urine,[3] as summarized in Table 1, are also important. Among these risk factors, the patient described in this report was female and had chronic constipation and indwelling catheterization, which, together with high urinary bacterial load, contributed to the development of purple urine in the collection bag.



IUC: indwelling urinary catheter.
Source: adapted from Kalsi et al.[4]
Figure 2. Formation of purple urine.

Table 1. Risk factors and mechanisms associated with purple urine bag syndrome.

Risk factors	Associated mechanisms
Female gender	Anatomy predisposing to UTI occurrence
Increased dietary tryptophan	Increased substrate for conversion
Alkaline urine	Facilitation of indoxyl oxidation
Severe constipation	Increased time for bacterial deamination
Chronic catheterization	Increased risk of UTI
High urinary bacterial load	Availability of bacterial sulfatases/phosphatases
Renal insufficiency	Impaired clearance of indoxyl sulfate

UTI: urinary tract infection.
Source: adapted from Khan et al.[3]

Although the condition has a characteristic presentation, limited awareness among health care professionals may lead to misdiagnosis or unnecessary concern. It is therefore important to evaluate each patient's clinical status, taking associated risk factors into account, and to investigate potential bacterial etiologies. While the diagnosis is primarily clinical, confirmation requires urinalysis, urine culture, and antibiogram to guide treatment with appropriate antibiotics.[4]

In the case presented, Ciprofloxacin was selected based on the pathogen's susceptibility and its availability in primary care

Treatment priorities include resolving the infection and replacing the urine collection system. An individualized approach is also necessary to address patient-specific risk factors. Frequent replacement of IUC is recommended, and in cases of recurrent PUBS, the use of non-plastic catheters may be considered.[4,6]

It is essential for the multidisciplinary team to understand the epidemiology of the population served by their primary health care unit in order to identify patients at risk for developing the condition described. The primary health care unit described in this report serves a registered population of 4,543 individuals, including 33 homebound patients, seven bedridden patients, and four users of IUC. Among the catheterized patients, only the patient presented in this case was bedridden.

CONCLUSION

It is important to emphasize that PUBS is an atypical form of UTI, frequently observed in patients with multiple comorbidities and particularly associated with constipation or renal failure. Although the diagnosis is primarily clinical, further investigation is necessary to guide treatment, which should address the infection, include replacement of the IUC, and manage patient-specific risk factors.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

GBS: Conceptualization, Data Curation, Formal Analysis, Writing – Review & Editing. DC: Conceptualization, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. HASC: Conceptualization, Data Curation, Formal Analysis, Writing – Original Draft, Writing – Review & Editing. JF: Conceptualization, Data Curation, Formal Analysis, Writing – Review & Editing.

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