Purple Urine Bag Syndrome: A Colourful Case Report

Síndrome da Urina Roxa no Saco Coletor: Um Estudo de Caso Colorido

Rita Abecasis[1], Teresa Alvim[1], Rodrigo Moraes[2], Luciana Martins Motta[2], Francisco Ferreira da Silva[2]*

***Corresponding Author**/Autor Correspondente:
Rita Abecasis [rita.abecasis@hotmail.com]
Rua Nova de São Mamede nº46 1º andar, 1250-173 Lisboa, Portugal

Abstract

Purple discoloration of a urinary catheter bag is an uncommon phenomenon which is part of an entity known as purple urine bag syndrome (PUBS). It is usually associated with bacterial urinary infections caused by sulfatase/phosphatase producing bacteria and occurs predominantly in elderly women, individuals with multiple co-morbidities and chronically catheterized patients. The incidence of PUBS has increased in recent years, often becoming a cause for concern among caregivers. For this reason, it is important to recognize its existence and promote prevention strategies. We hereby present a case report of this rare syndrome occurring in a 91-year-old man.

Keywords: Catheter-Related Infections; Urinary Catheterization; Urinary Catheters; Urinary Tract Infections

Resumo

A coloração roxa da urina no saco coletor é um fenómeno pouco comum que faz parte de uma entidade conhecida como síndrome da urina roxa no saco coletor (PUBS). Está geralmente associada a infeções urinárias bacterianas causadas por bactérias produtoras de sulfatase/fosfatase e ocorre predominantemente em mulheres idosas, indivíduos com multimorbilidade e doentes cronicamente algaliados. A incidência de PUBS tem aumentado nos últimos anos, tornando-se frequentemente um motivo de preocupação dos cuidadores. Por esta razão, é importante reconhecer a sua existência e promover estratégias de prevenção. No presente artigo, é discutido um caso clínico relativo à ocorrência desta rara síndrome num homem de 91 anos.

Palavras-chave: Cateteres Urinários; Cateterismo Urinário; Infeções Relacionadas a Cateter; Infeções Urinárias

Introduction

The practice of analysing the characteristics of a patient's urine is not new. On the contrary, the inspection of urine and its characteristics once represented a fundamental diagnostic tool, having gradually lost prominence over the years. Advances in technology have allowed the development of increasingly faster and more complete complementary diagnostic tools, rendering urine inspection "with the naked eye" somewhat obsolete.

However, the truth is that these aspects can still serve as the main diagnostic clue in some situations, such as the purple urine bag syndrome (PUBS). This strange syndrome is defined by the change in urine colour resulting from the presence of two different pigments (indigo and indirubin, derived from tryptophan) that precipitate and react with the synthetic material of the urinary bag, giving the accumulated urine a surprising purple colour. In the vast majority of the cases, this finding is asso-

1. NOVA Medical School, Lisbon, Portugal. **2.** Department of Internal Medicine, Clínica de Santo António, Lisbon, Portugal.
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ciated with the existence of a urinary tract infection, and various susceptibility factors that are conducive to the occurrence of this phenomenon have already been identified. These include female gender, advanced age, constipation, institutionalization, long term catheterization, dementia and chronic kidney disease.

This case report concerns a 91-year-old man who developed PUBS during hospitalization for acute myocardial infarction.

Case Report

We report the case of a visually impaired 91-year-old gentleman, with past medical history of hypertension, type 2 diabetes, coronary artery disease with previous angioplasty and bladder neoplasia treated with cystectomy, adjuvant chemotherapy and radiotherapy that subsequently required chronic abdominal urethrostomy in 2003.

The patient was admitted for an acute myocardial infarction (proximal and distal subocclusion of the anterior descendent coronary artery), along with iron deficiency anemia, which required transfusion of two blood units. Balloon percutaneous coronary intervention was performed on both lesions, leading to blood flow re-establishment (TIMI grade 2).

However, four days after the coronary intervention, purple discoloration and foul-smelling urine were noted (Fig. 1), as well as signs of prostration and somnolence. All of his medication was revised, but no pharmacological agent was found that could be associated with the change in urine colour. On physical examination, the patient was subfebrile, and there were debris within the drainage tube and indwelling catheter. Of note, this patient had been diagnosed with a urinary tract infection one week before admission. The urine culture performed at the time was positive for multi-sensible *Escherichia coli* (*E. Coli)* which was treated with amoxicilin-clavulanate.

Laboratory tests on day four after admission revealed an impaired renal function. Urinary analysis revealed a pH of 8.5, positive proteins (++), positive leukocyte esterase, positive nitrites and no red blood cells per high-power field.

The purple coloration of urine was then assumed to be an indicator of recurrence of the prior urinary tract infection. After urine culture, along with catheter and urine bag replacement, empiric antibiotic therapy was started with intravenous ceftriaxone 2000 mg once daily.

On the second day of antibiotic treatment, urine colour returned to normal, and the patient showed signs of clinical improvement.

The presumed urinary tract infection (UTI) diagnosis was not confirmed by urine culture, which was negative. Nevertheless, after receiving antibiotic treatment, there were no further changes in urine colour and the patient seemed to recover fully until he was discharged.

Discussion

Despite PUBS being a rare condition, it is still important to understand it since its identification, though reasonably simple, may have a significant impact on the patient's prognosis. The prevalence of this syndrome ranges from 8.3% to 42.1% in hospitalized patients,[1] and this trend has increased in recent years, which enhances the need for its recognition, especially by health professionals in contact with hospitalized patients.

The mechanism behind the purple coloration of urine was first identified in 1988, although the disease had already been described by 1978. Simply put, the aetiology of this phenomenon is related to the metabolism of tryptophan and the subsequent action of sulfatase/phosphatase-producing bacteria. First, tryptophan is metabolized in the gastrointestinal tract, generating indole, which is absorbed into the portal circulation. This metabolite is in turn converted to indoxyl sulphate in the liver and excreted in urine. There, in the presence of bacteria such as *E. coli, Klebsiella Pneumoniae, Proteus mirabilis, Morganella morganii* or *Pseudomonas aeruginosa*, it is transformed into indigo and indirubin in alkaline urine. Finally, the mixture of blue-coloured indigo and reddish-coloured indirubin leads to the formation of purple coloured urine accumulated in the bag.[2]

Knowing the pathophysiology of this colourful transformation of urine makes it easier to understand some of the risk factors that have been associated with this syndrome. Bacterial over-

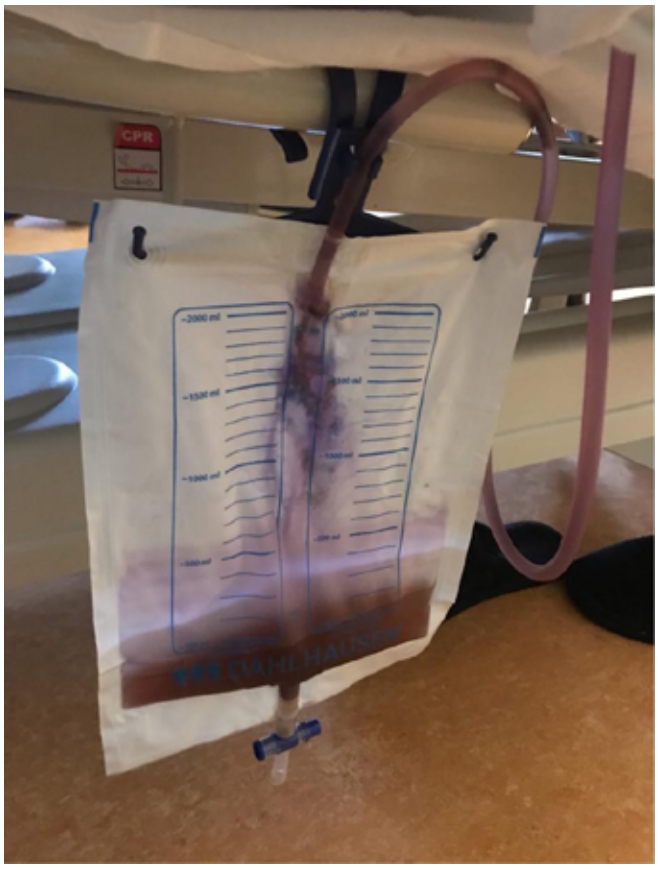

Figure 1. Purple discoloration of the urinary catheter plastic tube and bag.

growth, which is enhanced by chronic catheterization and constipation, implies a higher number of bacteria available for the transformation of tryptophan metabolites into indigo and indirubin.[3] Consequently, chronically constipated, and chronically catheterized individuals become more susceptible to PUBS. Since the combination of these two aspects is often found in older individuals with chronic kidney disease and increased need for hygiene care, the prevalence of this syndrome is logically higher in residential and nursing homes.[4] Therefore, implementing risk reduction strategies such as adequate bowel regimens and increased catheter replacement frequency, along with promoting proper nutrition and hydration, may be of greater benefit to the aforementioned institutions.

Our patient met the above-mentioned criteria, thus fitting into the PUBS model population. The urine pH of 8.5 found on urinalysis is also concurrent with this syndrome, as precipitation of pigments occurs mainly in alkaline urine.[1]

The presence of sulfatase-producing bacteria in the urinary tract often implies the coexistence of infection, and therefore the observation of purple urine should serve as a warning sign for the presence of underlying urinary tract infection (UTI). Treatment in these cases should be simplified, based on increasing the regularity of long-term catheter exchange. Urine culture and extensive workup are generally dispensable. In fact, in asymptomatic patients, management is directed mainly to treatment of underlying comorbidities, while in symptomatic patients, urine culture should be performed and targeted antibiotic therapy initiated.[2]

The fact that our patient had a history of recent UTI highlights the increased susceptibility of chronically catheterized individuals to infectious disease, which may in part be a result of poor outpatient care. Thus, despite having a relatively favourable prognosis, PUBS signals insufficient catheter hygiene, revealing gaps in the patient's basic care, which should always motivate an overall assessment of sanitary conditions and a review of good practices among family members or caregivers.[5] Such good practices encompass simple measures like cleaning the indwelling catheter and surrounding skin at least once a day and always washing hands before and after manipulating the catheter. The drainage bag should be changed every 5 to 7 days depending on the manufacturer or before that if any discoloration, foul smell or skin irritation is noted.[6]

Although in most cases the identification of PUBS is related to benign pathology, this is not always the case. There are cases described in literature,[7] that point to the possibility of evolution of this condition to Fournier gangrene, a subtype of polymicrobial necrotizing fasciitis that affects the perineal and genital regions and is associated with a high mortality rate. Therefore, despite the apparent harmlessness of purple urine, the presence of an underlying UTI may have serious consequences for patients with long-term urinary catheterization, in whom the classic symptoms of dysuria may not be so evident.[8] In addition, PUBS presents higher morbidity and mortality (4.3%) when compared to isolated UTIs that do not have this association.[9]

All in all, PUBS incidence in the institutionalized population is increasing, often generating anxiety in caregivers or family members, despite the fact that its identification has gone relatively unnoticed among health professionals. The disclosure of cases such as this one will likely raise awareness of this syndrome, thus promoting the early recognition and treatment of an underlying urinary tract infection, which could otherwise potentially develop into fatal complications. Prevention then becomes crucial and should include the adoption of higher hygiene standards for catheterization and adequate control of the patient's comorbidities, to avoid caregivers' concern and prevent less favourable outcomes.

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ORCID iD: Rita Abecasis https://orcid.org/0000-0001-9360-9293

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