

## Purple urine bag syndrome: case report for *Streptococcus agalactiae* and literature review

Síndrome da urina roxa na bolsa coletora: relato de caso por *Streptococcus agalactiae* e revisão da literatura

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### ABSTRACT

We report a case of purple urine bag syndrome, associated to *Streptococcus agalactiae* urinary tract infection, progressing to septic shock and death. We present a review of the literature on the subject and take the opportunity to attend readers about increasing incidence with population aging and its potential bad outcome.

**Keywords:** sepsis; shock, septic; urinary tract infections; urine specimen collection.

### RESUMO

Relatamos um caso de síndrome de urina roxa na bolsa coletora, associada à infecção do trato urinário por *Streptococcus agalactiae*, evoluindo para choque séptico e óbito. Apresentamos ainda uma revisão da literatura sobre o assunto e aproveitamos para atentar os leitores sobre o aumento de sua incidência com o envelhecimento populacional e seu potencial mau prognóstico.

**Palavras-chave:** coleta de urina; choque séptico; infecções urinárias; sepse.

### CASE REPORT

A 83 years-old female with a history of arterial hypertension, diastolic heart failure, chronic kidney disease non-dialysis (CKD-EPI e-GFR = 52.2 ml/min/1.73m<sup>2</sup>), paroxysmal atrial fibrillation in anticoagulation treatment with rivaroxaban and a stroke 2 years ago, who had been recently hospitalized due to decompensation of cardiomyopathy, being discharged home with loss of previous functionality.

The patient was admitted to a tertiary hospital emergency with a 1-day history of darkened and fetid feces in the diaper, associated to prostration. No melena was detected through rectal exam and upper gastrointestinal endoscopy did not reveal any signs of bleeding. The patient evolved with a consciousness level decreasing, being intubated for protection of airway, and posteriorly presented septic shock, being transferred to the ICU.

During indwelling urinary catheter insertion, the patient exteriorized pyuria. She undergone a urine culture and started an antibiotic therapy with

piperacillin-tazobactam, due to recent hospitalization. On hospital day 2 the patient evolved with refractory shock and her urine was noted to be purple in urine bag (Figure 1), being expanded antibiotic therapy through meropenem empirically. Urine culture done on patient's admittance presented *Streptococcus agalactiae* development. Despite the use of vancomycin after culture's result, patient came to death.

### LITERATURE REVIEW

Purple urine case was first noted by Barlow and Dickson in a letter to *The Lancet* in 1978, having identified the presence of indigo through spectrometry and raising the hypothesis of it being result of the excretion of indoxyl sulfate, generated from degradation of intestinal triptophan.<sup>1</sup>

Subsequently, other authors questioned urine color, as indigo would be related to blue coloration, formulating the hypothesis that the urine would turn purple only when in contact with the urine bag; they

**Figure 1.** Bag showing purple urine.

have also associated it to the presence of bacteria as *Pseudomonas aeruginosa* and *Proteus spp.*<sup>2</sup>

In these initial reports, authors already related the syndrome to elderly women with a history of dementia and constipation. McSherry<sup>3</sup> has also corroborated the idea of purple urine bag being attributed to the presence of indigo as an indoxyl sulfate metabolite product from the degradation of intestinal triptophan, but later studies pointed indicanuria as cause of purple coloration.<sup>4,5</sup>

Dealler *et al.*<sup>6</sup> have studied six cases of the syndrome and associated it to urinary infection by *Providencia suartii* and *Klebsiella pneumonia* with presence of indigo and indirubin in urine; they have also found in laboratory that only these species and *Enterobacter agglomerans* were capable of producing indigo *in vitro*.

In the decade of 1990, Umeki<sup>7</sup> noted that the indoxyl sulfate ability of changing into indigo (blue) and indirubin (red) was mediated by bacterial enzymes called indoxyl phosphatase and sulfatase, produced by *Proteus mirabilis* and *Klebsiella Pneumoniae*, being catalyzed in alkaline urine. Almost a decade later, the purple urine bag syndrome was associated to women and alkaline urine, being urinary infection the most important risk factor in its occurrence.<sup>8</sup>

Literature shows purple urine bag syndrome occurrence is more common in elderly women, users of indwelling urinary catheter, constipated and presenting alkaline urine.<sup>8-12</sup> The presence of alkaline urine was posteriorly reported in a case-control study.<sup>13</sup>

Recently, a cohort demonstrated the incidence of purple urine bag syndrome in 16.7% of institutionalized patients relating it to women with presence of gram-negative in their urine culture (*Pseudomonas aeruginosa*, *Citrobacter koseri*, *Providencia rettgeri*, *Morganella morganii* and

*Escherichia coli*), questioning the necessity of alkaline pH in urine for its occurrence.<sup>14</sup>

Recent literature reviews established that constipation associated to bacterial hyperproliferation leads to loss of amino radical tryptophan and indole formation, conjugated into indoxyl sulfate in the liver; the action of bacterial enzymes in the urine, sulfatase and phosphatase, produces indigo (blue) and/or its oxidation into indirubin (red), that occurs while in touch with the urine bag.<sup>15,16</sup>

Bar-Or *et al.*<sup>17</sup> reported a few years ago the occurrence of purple urine bag syndrome in non-alkaline environment, also associated to the presence of indigo. Chung *et al.*<sup>18</sup> registered the syndrome in acid urine with gram-negative bacteria development in urine culture. In 2007, the syndrome was first related to death.<sup>19</sup> More recently, awareness around the uncertainty of the syndrome benignity rose due to another death case. On this occasion, the urine culture revealed the presence of *Pseudomonas aeruginosa* and *Enterococcus* resistant to vancomycin.<sup>20</sup>

## DISCUSSION

The reported patient had been recently hospitalized due to heart failure decompensation and, reviewing medical records, there was no registry of the use of antibiotics on the occasion. Despite the suspicion that brought the patient suggesting occurrence of high digestive hemorrhage, the performance of endoscopic study in the emergency room revealed no bleedings.

In quick evolution, patient evolved into a consciousness level decreasing and hypotension, being transferred to our ICU; on indwelling urinary catheter, patient exteriorized dark colored pyuria. The laboratory tests done on admission revealed an acute renal lesion (KDIGO stage 3) and a count of 62,000 leukocyte/mL in urine, with bacteriuria and pH = 5.0; CBC did not showed signs of leukocytosis.

The patient received piperacillin-tazobactam empirically immediately after the collection of cultures and intensive support for septic shock following both institutional and international protocols. The empirical choice of broad-spectrum antibiotics therapy was due to recent hospitalization. On day 2 of hospitalization, the presence of purple urine in the urinary bag was observed.

In a fast literature review, we broadened the spectrum of antibiotics therapy to meropenem, to cover ESBL (extended-spectrum beta-lactamase)

germs producers, common in our services. The blood cultures collected on admittance of the patient did not show any bacterial development, but the urine culture revealed presence of *Streptococcus agalactiae* (superior to 1,000.000 UFC/mL). Despite the efforts and all the support, perhaps due to several comorbidities and advanced age, the patient came to death on day 3 of hospitalization.

In this report, we noted the occurrence of purple urine bag syndrome in non-alkaline environment, which could be related to a laboratory error - since we just had a single sample, and associated to urinary infection by an uncommonly germ linked to the syndrome. Despite many case reports relate the syndrome occurrence with benignity, we warn the readers to its possible mortality, as other authors have already reported.

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