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Purple urine bag syndrome: A rare complication of urinary tract infection

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ABSTRACT

Introduction: Purple urine bag syndrome (PUBS) is a rare condition that occurs as a complication of urinary tract infections (UTI) characterized by the production of purple urine in tubes and catheter bag, related to the aberrant metabolism of tryptophan, it represents an alarming clinical condition for patients and their relatives. However prognosis is good in most of the patients but it is associated with a high mortality due to patients' comorbidities.

Case Report: This is a 66-year-old female patient with a history of Parkinson's disease with a history of chronic constipation and decubitus ulcers in the lumbosacral region and chronic use of a catheter bladder, secondary to the neurological pathology. She went to the emergency department with evidence of purple coloration in the urine as well as in the bag. A culture of the catheter tip showed Escherichia coli sensitive only to ertapenem, for which medical treatment was started and the urinary catheter changed, medical surveillance is continued by the outpatient clinic, reassessing the patient at 3 weeks with light yellow urinary output without stench.

Conclusion: The purple urine bag syndrome is an infrequent syndrome that requires multiple risk factors for its presentation, and despite the fact that most patients do not present any symptoms, in addition to the strange appearance of urine, it represents bacteriuria that may or may not require medical treatment based on antibiotics, but that necessarily requires the replacement of the urinary bag.

Keywords: Purple urine bag syndrome, Purple urine discoloration, Urinary bag, Urinary tract infection

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INTRODUCTION

Purple urine bag syndrome (PUBS) is a rare phenomenon that occurs as a complication of urinary tract infection, which can be of great concern to patients and their families. It is characterized by the production of purple urine, visible in the catheter tubes and bags. As a rare entity, the lack of knowledge of the doctor can result in erroneous diagnoses and inappropriate treatments [1].

CASE REPORT

This is a 66-year-old female patient with a history of systemic arterial hypertension and Parkinson's disease of more than 15 years of evolution under medical treatment, with a history of chronic constipation and decubitus ulcers in the lumbosacral region and chronic use of a catheter bladder, secondary to the neurological pathology. She went to the emergency department after presenting mild hypogastric pain, without nausea, vomiting or fever, on physical examination with evidence of purple coloration in the urine as well as in the bag (Figure 1). Reason for why hematic biometry, blood chemistry, general urine examination, foley catheter tip culture is requested and the foley catheter is replaced, showing urine stench when performing these studies (Figure 2).

Anemia, cloudy yellow urine, leukocyturia, bacteriuria were found in laboratories, rest within normal values (Figure 3). At 48 hours the result of the bacteriological culture of the catheter tip was with *E. coli* sensitive only to ertapenem, for which hospital medical treatment was started and the patient was discharged after 48 hours to continue home management. Medical surveillance is continued by the outpatient clinic, reassessing the patient at 3 weeks with light yellow urinary output without stench (Figure 4).

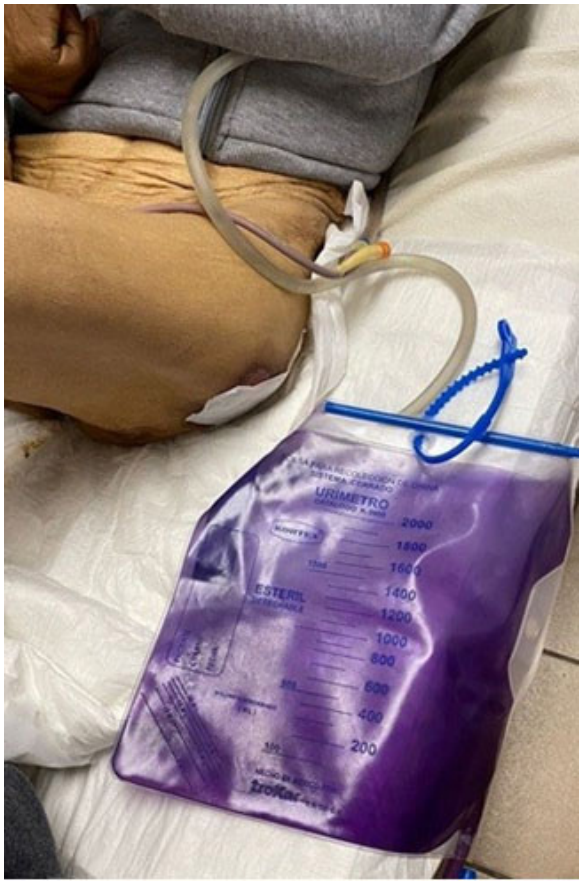

Figure 1: Bedridden patient with evidence of purple coloration in the urine as well as in the bag.

Figure 2: Urinary catheter tip ready for urine culture.

Figure 3: Cloudy yellow urinary sample.

Figure 4: Urinary bag after replacement and after the end of medical treatment, without evidence of purple coloration or turbidity.

DISCUSSION

This syndrome was first described by Barlow and Dickson in 1978, after observing purple urine in a patient with prolonged urinary catheterization [2]. From ancient times, when Hippocrates was credited with being the original uroscopist, until the Victorian era, urine was used as the primary diagnostic tool. Urinary color, smell, sediment even taste could provide important information related to several medical conditions [3].

The prevalence of this entity ranges between 9.8% and 16.7%, it usually affects the extremes of life. In some case it has been reported in pediatrics who had intussusception or Drummond syndrome, a rare autosomal recessive disorder known as "blue diaper syndrome" in which tryptophan metabolism is affected by excess indoles produced in urine [4, 5].

Purple urine bag syndrome require the presence of multiple risk factors; urinary catheterization, dementia, chronic kidney disease, alkaline urine, increased urine bacterial load, the use of polyvinyl chloride urine bags, UTI, high level of tryptophan in diet, chronic constipation leading to a bacterial overgrowth in patients with intestinal hypomotility and female gender due to a shorter and closer urethra to the anus, which increases the prevalence of bacterial UTIs compared to men [6].

Moreover, some studies show necessity of concentration of certain pigments be required for the precipitants to become urine macroscopic purple [2].

This condition is due to a chain reaction that affects the metabolism of tryptophan that leads to urinary by-products: indirubin and indigo. This amino acid participates in the biosynthesis of proteins, in the large intestine is transferred in order to be metabolized into indole by gut microbiota. Subsequently it is dispersed into the portal circulation and enters into the liver where it is transformed into 3-hydroxyindole through cytochrome P450 2E1 (CYP2E1). 3-Hydroxyindole is sulfonated through human liver SULT1A1 isoform, leading to indoxyl sulfate formation. Indoxyl sulfate (indican) is excreted in the urine tract. The bacterial enzymes such as sulfatases and phosphatases in an alkaline environment are necessary for the formation of the pigments. The mixture is responsible for the characteristic purple color observed in this syndrome [3].

Regarding the prevalence in patients with urinary catheter, there does not seem to be related with the time of catheter placement, it may occur hours or days after the catheter insertion, a prevalence of 9.8% has been observed in chronic care units, 8% in patients with chronic indwelling catheters and up to 42.1% in a nursing home setting [5].

Patients with chronic kidney disease present limited elimination during dialysis of albumin-bound products such as indoxyl sulfate, increasing its concentration in plasma. It is known that alkaline urine facilitates pigment precipitation in synthetic materials of urine catheters and bags. Despite this, PUBS has been also described in acidic urines [6].

The most related bacteria to PUBS are *Providencia* spp., *E. coli*, *Proteus* spp., *Pseudomonas* spp., *Klebsiella pneumoniae*, *Morganella* spp., and *Enterococcus* spp., which can metabolize the products of into red and blue pigments [7].

This syndrome by itself is not a usually severe, but it reflects presence of bacteria in urine, which may be associated to serious conditions due to comorbidities and long-term bed rest [6]. Patients with PUBS are usually asymptomatic, except for the unusually purple color of the urine, fever, abdominal pain, and other features of UTI are observed in some patients, complications are usually not related with PUBS [8].

One of the most important laboratory findings is urine alkalization and positive urine culture [5]. In the actuality, it is still the clinician's choice the use of antibiotics, some of the indications include symptomatic UTI, sepsis and signs of contiguous infection or persistent PUBS in immunosuppressed patients [5].

Treatment in asymptomatic patients consists in resolving the underlying medical and regular changing of drainage bags and catheters [2, 8].

Immunosuppressed patients are more at risk of progressing to Fournier's gangrene with high rates of morbidity and mortality [9].

Also, the elimination of indoxyl sulfate during dialysis in patients with chronic kidney disease and PUBS leads to exponential increase in serum indoxyl sulfate concentration, which is a uremic toxin involved in chronic kidney disease (CKD) progression and cardiovascular disease [9].

CONCLUSION

The purple urine bag syndrome is an infrequent syndrome that requires multiple risk factors for its presentation, and despite the fact that most patients do not present any symptoms, in addition to the strange appearance of urine, it represents bacteriuria that may or may not require medical treatment based on antibiotics, but that necessarily require the replacement of the urinary bag, as well as education for family members or caregivers to avoid its occurrence such as washing the hands before and after handling the catheter, clean the area around the catheter at least once a day, and recommend indwelling urinary catheter only for short-term use (less than 30 days preferably no longer than two weeks), given its relationship with other life-threatening diseases such as Fournier's gangrene.

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Carlos Tadeo Perzabal Aviléz – Conception of the work, Analysis of data, Interpretation of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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