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A Case of Purple Urine Bag Syndrome in a Patient with an Ileal Conduit

Ryan Don Aycock

Washington Hospital Center, Washington, DC, USA

Abstract

Purple urine bag syndrome (PUBS) is typically a benign condition in which the urine in a Foley bag becomes purple. This situation is thought to arise from a series of steps involving the conversion of tryptophan to pigmented indigo and indirubin. While there are multiple factors associated with PUBS, no definitive causative agent has been identified. Presented here is the case of a patient with an ileal conduit who developed purple urine during his hospitalization.

Keywords: Urinary Diversion, Urinary Catheterization, Urinary Tract Infections

Introduction

Purple urine bag syndrome (PUBS) is a rare condition found in chronically catheterized patients in which the urine in the Foley bag becomes purple. It is associated with debilitation, bacteriuria (1), female gender (2), chronic constipation (1, 3), renal failure (4), alkaline urine (2), and use of a polyvinyl chloride Foley bag (3). It is usually a benign condition that requires no treatment other than changing the Foley, although antibiotics are occasionally used (1).

Presented here is the case of a gentleman with an ileal conduit who developed purple urine bag syndrome during the course of his hospitalization. A review of the literature is also given.

*Correspondence:
Ryan Don Aycock, MD
110 Irving St NW, Suite G213E Washington, DC, 2010, USA
Tel: +202-877-7000
Email: ryanaycock@gmail.com
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Case Report

A 73-year-old African American male with a history of mild dementia, metastatic bladder cancer, and paraplegia from T10 and below presented to the emergency department with a 2-day history of abdominal pain, nausea, and vomiting. He had previously undergone a radical cystoprostatectomy with ileal conduit and urinary diversion six months prior. On exam, his abdomen was distended and mildly tender, but without peritoneal signs. An abdominal X-ray revealed dilated loops of small bowel. A CT scan failed to locate a source of obstruction. He was admitted to the general surgery service with a diagnosis of partial small bowel obstruction, was made NPO, given an NG tube, and started on IV fluids. Repeated attempts were made to advance his diet, but he continued to have bouts of emesis and constipation.

On hospital day 6 his urine was noted to be purple in color (Figures 1 and 2). A urine culture grew >100,000 CFU/mL

Figure 1. Purple urine noted in a Foley bag

Figure 2. Purple urine noted the Foley tubing

of Proteus mirabilis. As he remained afebrile with a normal white count, the bacteriuria was felt to be benign in nature and no antibiotics were started. The Foley bag and tubing were changed and the urine color returned to light yellow.His nausea symptoms dissipated with the aid metoclopramide and dexamethasone and he was eventually discharged with a diagnosis of carcinomatosis.

Discussion

Purple urine bag syndrome is a rare condition found in chronically catheterized patients in which the urine in the Foley bag becomes purple. It is so rare that the National Library of Medicine does not have a MeSH term for it. First described in 1978 (5), this condition is thought to arise from a series of steps outlined in Figure 3. First, tryptophan in the GI tract is converted to indole by anaerobic bacteria (6). Next, indole is absorbed into the blood stream and enters the enterohepatic circulation, where the liver converts it to indoxyl sulphate (also known as indican) (7). Indican is excreted in the urine where bacteria producing indoxyl sulphatase/phophatase convert it into indoxyl. Finally, oxidation of indoxyl-usually in alkaline urine-produces the products indigo (a blue pigment) and indirubin (a red pigment). These pigments combine to form purple urine.

As PUBS is such a rare condition, the best available data comes from basic science research and case-control analyses. The steps listed above are thought to be enhanced through several risk factors. Given that tryptophan's conversion to indole occurs in the intestine, conditions that would increase the time exposure of food products to bacteria are associated with an increased incidence of PUBS. Constipation has been reported in multiple papers as it leads to bacterial overgrowth (1, 3). As tryptophan turns over in the gut, decreased absorption of amino acids occurs and decreased serum tryptophan levels are found (8). Renal failure patients also have higher rates of PUBS (4). The mechanism is thought tobe due to the

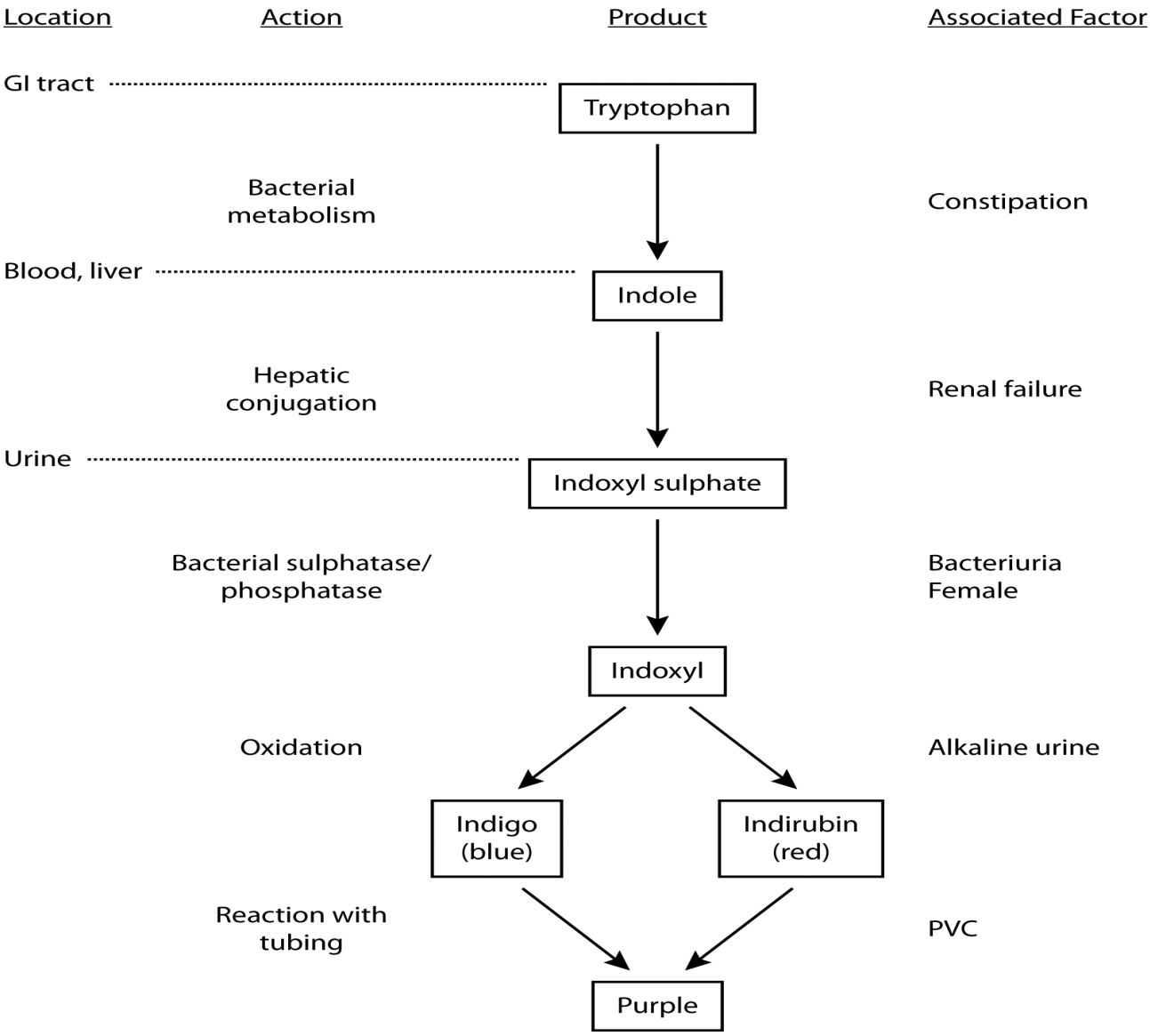

Figure 3. Proposed mechanism for maling of purple urine

impaired excretion of indoxyl sulphate, leading to higher serum and urine concentrations. Of note, indoxyl sulphate cannot be removed in dialysis (9).

Several bacterial species have been found in the urine of PUBS patients, including Pseudomonas aeruginosa, Citrobacter koseri, Providencia rettgeri, Morganella morganii and Escherichia coli (1). This list is by no means comprehensive, but does illustrate that gram-negative bacteria producing indoxyl sulphatase/phophatase are thought to be the causative agents. For this patient with an ileal conduit, Proteus was isolated. As noted in one retrospective analysis of urinary diversions, 23% of patients developed urinary tract infections (10).

Of note, the particular species appears to be less important than the overall number of bacteria isolated. According to one series, PUBS patients typically have hundreds of thousands to millions of colony-forming units isolated from urine samples (2). Case reports involving female patients are more commonly found as women are usually more prone to urinary tract infections from an indwelling Foley catheter (2).

Alkaline urine is frequently reported as a risk factor

in the literature. While some bench-top research has demonstrated bacteria grown in alkaline environments tend to convert indoxyl to indigo more so than normal pH's (11), according to Mantani et al, although this association exists, it is not statistically significant (2). Other reports have surfaced with PUBS found in acidic urine (12).

Finally, the material used in the Foley bag seems to play a role in PUBS. In one case-control study, polyvinyl chloride (PVC) bags were more frequently associated with purple urine when compared to non-PVC bags (3). Again, this association exists, but is not statistically significant. One idea proposed for mechanism of PUBS is that the purple discoloration is really a staining of the PVC, and not the true color of the urine. For this patient the color of the urine changed once moved to a polyethylene canister consistent with other reports (1).

Conflict of Interest

There is no perceived conflict of interest.

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