Purple urine bag syndrome in a patient with a nephrostomy tube

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Abstract
Purple urine bag syndrome is an uncommon condition characterised by purple colouring of the urine in a chronically catheterised patient. Typically seen in patients with a Foley catheter in the bladder, we report an uncommon case of purple urine bag syndrome in a patient with a long-term nephrostomy tube and discuss the pathophysiology of this condition.

Case report
A 78-year-old female patient with a history of leukaemia and obstructive uropathy requiring a nephrostomy tube presented to our interventional radiology department for routine change of her nephrostomy tube. We were struck by the appearance of her urine bag and tubing, both of which were vivid purple in colour (Figure 1). The patient was asymptomatic, afebrile, and had normal vital signs.

Figure 1. First panel shows marked purple colourisation of the urine bag and the tubing extending from the nephrostomy. The second panel is a close-up on the urine bag further demonstrating its purple colour.
Discussion

First described in 1978, purple urine bag syndrome (PUBS) is an uncommon condition. It is typically seen in patients with chronic bladder catheterisation and accompanying colonisation by bacteria possessing certain enzymes. Purple urine bag syndrome in the setting of a nephrostomy tube appears to be very uncommon; to our knowledge only one other case has been reported in the literature. Other associated risk factors include bedridden status, constipation, female gender, alkaline urine, and receiving a diet high in tryptophan.

The exact biochemical cause of PUBS is unknown; however, most authors believe it is a mixture of indigo (blue) and indirubin (red) that becomes purple in colour. The pathway begins when tryptophan is metabolised by the normal gut flora to indole. Indole is absorbed by the portal circulation and converted in the liver to indoxyl sulphate. Indoxyl sulphate is excreted in the urine and, in the presence of an alkaline environment and bacterial enzymes (indoxyl sulphatase and indoxyl phosphatase), indoxyl sulphate is metabolised into indigo (blue) and indirubin (red) which gives urine a purple colour (Figure 2).

Figure 2. Metabolic pathway of purple urine bag syndrome

Bacterial species that can produce indoxyl sulphatase and indoxyl phosphatase include (but are not limited to) Providencia stuartii, Providencia rettgeri, Klebsiella pneumoniae, Proteus mirabilis, Escherichia coli, Morganella morganii, and Pseudomonas aeruginosa.
PUBS is generally a benign condition that reflects bacterial colonisation of a chronically catheterised urinary tract. It resolves after managing the associated urinary tract infection and/or removal of the catheter.\textsuperscript{2,3}

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