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CASE REPORT

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## CASE REPORT: PURPLE URINE BAG SYNDROME

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### ABSTRACT

Purple urine bag syndrome (PUBS) is a rare and strikingly prominent phenomenon associated with recurrent urinary tract infection caused by bacteria with indoxyl phosphatase and sulfatase activity. Recognising this entity is important to avoid undue investigations, misdiagnosis and erroneous treatment. We report an interesting case of PUBS in a 76-year-old female patient who developed PUBS secondary to UTI caused by ESBL *Proteus mirabilis*. Also, to the best of our information this is the first case of PUBS reported from this region.

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## INTRODUCTION

Purple urine bag syndrome (PUBS) is a rare and strikingly prominent phenomenon associated with recurrent urinary tract infection caused by bacteria with indoxyl phosphatase and sulfatase activity. Recognising this entity is important to avoid undue investigations, misdiagnosis and erroneous treatment. We report an interesting case of PUBS in a 76-year-old female patient who developed PUBS secondary to UTI caused by ESBL *Proteus mirabilis*. Also, to the best of our information this is the first case of PUBS reported from this region.

## CASE REPORT

A 76-year-old Female admitted to hospital with complaints of fever, multiple episodes of loose stools, vomiting, and pain abdomen for last 3 days. She is a known case of DM 2, HTN, and CVA and is bedridden with indwelling urinary catheter for more than 2 years. She also complain for the striking purplish discoloration of urine along with purplish discoloration of the tubing and the bag shown in Figure 1. Her family members were very worried looking at her urine colour. Detail history taken from them revealed no history of ingestion of any dye or any other medication. At the time of admission, she was conscious but slightly drowsy and hemodynamically stable. She had temp of 100° F, BP 120/66 mm of Hg, pulse 96/mt and RR of 22 breaths per minute with spo2 of 98% at room air. Her routine labs including CBC, KFT and LFT were in normal range. Urine routine and microscopy revealed significant pyuria (15-20 WBC) and

bacteruria with nitrite and leucocyte esterase positivity, no RBC with urinary PH of 8. Her urinary catheter along with urine bag was changed. Details of all the investigations are described in table 1. She was started on empirical broad-spectrum antibiotic. 3 days later urine culture report showed significant growth with greater than 10<sup>5</sup> CFU of *proteus mirabilis*. It was ESBL producer organism. Culture sensitivity report showed sensitivity to carbapenems. Her antibiotic was modified as per culture sensitivity report. She was started on ertapenem 1 gm intravenous once daily. After next 24 hours her urine became normal in colour and patient clinical condition also improved. She completed 5 days course of ertapenem and was discharged home in a stable condition. At the time of discharge her family was counselled and informed in detail about the syndrome called PUBS.

## DISCUSSION

It is first described by Barlow GB and Dickson JAS in 1978. (1) PUBS is a rare clinical entity in which purple discoloration of catheter bag, tubing and urine occurs due to the production of mixture of blue indigo pigment and red indirubin pigment. These pigments are produced due to altered metabolism of tryptophan. PUBS is usually a side effect of prolonged catheterisation along with urinary tract infection caused by bacteria that metabolize by products of tryptophan into red and blue pigments. Most common bacterial species associated with PUBS are *Providencia stuartii* and *Providencia rettgeri*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Escherichia coli*, *Pseudomonas*, *Morganella* and *Enterococcus*.

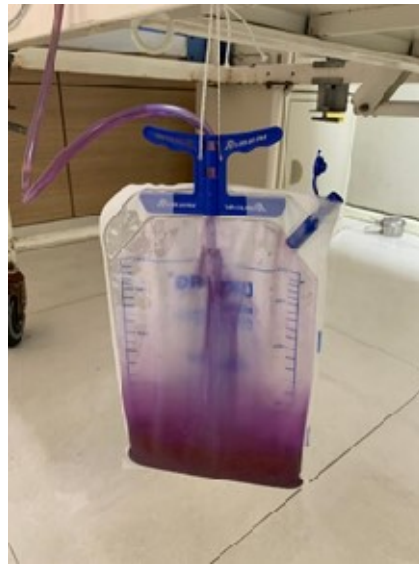


Figure 1 showing purple discoloration of urine along with urine bag and tubing

Table 1. Depicting the test results and normal range of laboratory values

CBC (Normal Range)	TLC (4000-1000)cumm	HB (12.0-15.0)gm/dl	MCV (83-101)fl	Platelets (1.5-4.1)Lakhs/cu.m	PCV (36-46)%			
Report	9810	11.3	81	1.91	35.4			
KFT (Normal Range)	Urea 14.98-36.31)mg/dl	Creatinine (0.52-1.04)mg/dl	Sodium(135-155)mmol/L	Potassium(3.5-5.5)mmol/L				
Report	35	0.8	136	4.0				
LFT (Normal Range)	SGOT (14-36)u/l	SGPT (9-52)u/l	T. bilirubin(0.2-1.3)mg/dl	Alkaline phosphatase (38-126)ul				
Report	27	24	1.0	118				
URINE ROUTINE (Normal Range)	COLOUR Pale yellow	PH (4.6-8.0)	WBC (0-5/HPF)	RBC (0-2/HPF)0	Leucocyte esterate	Nitrite	bacteria	SP.gravity (1.003-1.035)
Report	Purple	8.0	15-20	0/HPF	+2	+2	Present	1.015
Urine culture report	Proteus mirabilis 10 <sup>5</sup> (ESBL )	Sensitive to Ertapenam						

Sulphatase and phosphatase produced by these gram-negative bacteria are responsible for pathogenesis of this syndrome. (2)In this case report, we detected the growth of *Proteus mirabilis* in urine culture sample. Risk factors for PUBS are elderly females, chronic catheterization, patients in long-term care institutions, constipation, intestinal bacterial overgrowth alkaline urine, increased dietary tryptophan, alkaline urine, high urinary bacterial load, renal failure, and the use of a polyvinylchloride (PVC) plastic catheter.(3)Though it is a benign disease but rarely it may present as severe illness.(4) Further it can cause great concern for patients, their family and also to healthcare workers if they are unaware of the entity. A series of biochemical reactions take place in development of this syndrome starting with deamination of tryptophan. Patients eating diet rich in tryptophan are more predisposed for development of PUBS. Bacteria in gastrointestinal tract deaminates tryptophan to produce indole. Indole is converted by conjugation to indoxyl sulphate in the liver. This is secreted into urine where bacteria producing sulphatase and phosphatase convert it to indoxyl. Indoxyl is oxidised to indigo (a blue pigment) and indirubin (a red pigment) in alkaline urine though it can happen in acidic urine too. (5, 6) These pigments react with catheter tubing to produce a striking purple colour. There are several causes of altered colouration of urine, including haematuria, haemoglobinuria, myoglobinuria, nephrolithiasis, UTIs, poisons, dyes, drugs, porphyria and alkaptonuria but there is no other cause of strikingly evident purple discoloration of urine and urine bag other than PUBS. Hence PUBS is a spot diagnosis. Though this is a spot diagnosis, it needs to be confirmed with history, examination, and urinary investigations. A clinician unaware of this phenomenon may misdiagnose, over investigate or overtreat it. It is important for the medical practitioner to know the aetiology and pathogenesis of this syndrome so as to appropriately treat this condition.

Though there are no standard guidelines on how to manage PUBS, It is important to treat it correctly. Management of PUBS includes use of appropriate antibiotics to treat UTI, replacement of catheter, its tubing along with the bag, use of non-plastic catheter and treatment of constipation. (7)

## CONCLUSION

This case report emphasizes the need to increase awareness of spot diagnosis of PUBS. This kind of discoloration of the urine can be highly distressing for patients and their families but mostly it is a benign condition. Hence patient and families should be informed about the nature and clinical outcome of the condition. Management involves antibiotics for UTI, regular catheter changes and treatment of constipation if needed. Awareness of this entity will help in reducing the unnecessary testing, misdiagnosis and erroneous treatment.

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