IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 3 Ser. 16 (March. 2019), PP 85-89
www.iosrjournals.org

The Enigma Of Purple Urine Bag Syndrome, Is It Truly Harmless?

Sood M.A[1], E.Getambu[1], D. Rambei[1]
1 Department of Internal Medicine, Nephrology unit Coast Provincial General Hospital (C.P.G.H),Mombasa, Kenya
Address for correspondence: Dr Sood M.A Department of Internal Medicine, Coast Provincial General Hospital (C.P.G.H), Mombasa, Kenya.
Corresponding Author: Sood M.A

Abstract: *Purple urine bag syndrome (PUBS) is a unique complication of urinary tract infection (UTIs). It is characterized by an alarming purple coloration of the catheter bag and tubing due to recurrent UTIs by specific bacteria which produce sulphatases and phosphatases which lead to tryptophan metabolism to produce indigo which is Blue pigment and indirubin which is red pigment, which when they mixture becomes purple. The risk factors include female gender, immobility, constipation, chronic cauterization and renal disease. The Management involves regular catheter change, antibiotics and reassurance. The prognosis is good depending on the co-morbidities of the patient which can be associated with high morbidity and mortality. We focus on a case report of this rare phenomenon occurring in a 65 year old male patient.*

Keywords: *Chronic urinary catheterisation, indigo, indirubin, purple urine bag syndrome, urinary tract infection*

Date of Submission: 20-03-2019 Date of acceptance: 06-04-2019

I. Introduction

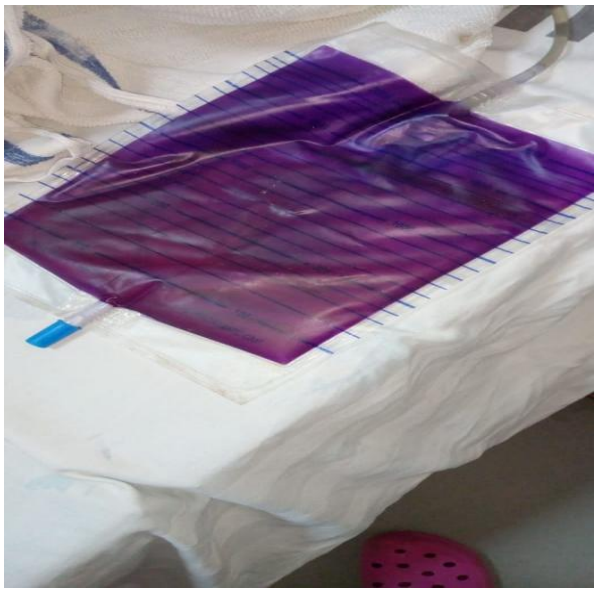
Purple urine bag syndrome was first discovered in 1978 [1] and refers to the discolouration of the urine in the drainage bag that occurs in patients with long term urinary catheterization. This phenomenon is associated with bacteria which produce sulfatase or phosphate. The estimated range of PUBS prevalence is between 8.3% and 42.1%with indwelling of Catheter for very long time [2].The PH of the urine is 7.0 or and above has been reported in patients with PUBS compared to patients without this syndrome. The association of alkaline urine and formation of indigo and indirubin is well known although some cases of PUBS have been reported without alkalized urine.[3]Purple urine syndrome is may appear asymptomatic and harmless; however caution is advised some cases have reported progression to severe disease states.

II. Case Study

We are presenting a patient from Coast provincial General hospital(C.P.G.H), age 65 year old male patient with Benign Prostate hypertrophy(BPH) on Foley's catheter for 1 month(regular change every 2 weeks), Hypertension for the last 5 year on medication, Chronic kidney disease for last 1 year on dialysis twice weekly and chronic constipation.

He presented to our renal unit with complaints of discoloration of urine to purple color. For the past 2 days the urine bag contained dark brown particles which gradually changed to purple colour. He denies any history of consuming any other medication apart from the prescribed medication for hypertension, no history of herbal intake. He gives history of constipation and bloating for the last 3 weeks which he decided to be taking yogurt (200mls twice daily) to help with his constipation.

On examination, the patient was stable with mild conjunctival pallor, blood oxygen saturation of 96% on room air, blood pressure 131/67mmHg, heart rate 94/min, respiratory rate 18/min and temperature 36.6^{o}celcius . The abdomen was mildly distended with increased bowel sounds and epigastric tenderness. Examination of other system was unremarkable. A full blood count done which showed WBC 9.6, Hb 8.2 and Platelets of 345. His Urinalysis results showed an alkaline PH 8.0 with mild proteinuria, pus cells and RBC casts. Urine culture grew E-coli. Consent was obtained from the patient before photos of the urine bag were taken (fig.1.0)



Patient having Purple urine syndrome fig 1.0

The catheter was changed and antibiotic was modified according to the sensitivity and was changed to oral ciprofloxacin. He was also given oral preparation of glycerol for his constipation. The patient was followed up and the purple urine gradually cleared up after about 5 days of antibiotics administration. He was also counselled on dietary intake.

Risk Factors

The major risk factors implicated in etiology of PUBS are outlined in Table 1.1

Table 1.1: Risk factors and associated mechanisms in PUBS.[2]

Risk factors for PUBS	Associated mechanisms
Female gender	Predisposing anatomy to UTI occurrence
Increased tryptophan dietary content	Increased available substrate for conversion
Increased urine alkalinity	Facilitates indoxyl oxidation
Severe constipation	Increased time for bacterial deamination
Chronic indwelling urinary catheterization	Increased risk of UTIs
High urinary bacterial load	Bacterial sulfatase/phosphatase availability
Renal failure	Impaired clearance of indoxylsulfate

There are some risk factors related to PUBS. These risk factors may include the gender of the patient. Females are more tends to suffer from PUBS because of their predisposing anatomy to UTI [18]. Urinary tract of females is exposed to the air more than males. Hence, chances of UTI are greater for females. Apart from that increased amount of tryptophan dietary content in the urine may cause PUBS as bacteria present in the urinary tract may get plenty of dietary substances [13]. Increase of alkalinity in the urine may induce the indoxyl oxidation. Apart from that severe constipation among the people increase the bacterial deamination time which may lead to PUBS. High bacterial load in the urine increase the availability of sulfatase and phosphatase which trigger the PUBS [3]. Renal failure can be stated as the risk of PUBS too. It may lead to impaired clearance of indoxylsulfate. Moreover, long term indwelling of a urinary catheter may cause PUBS in humans.

Pathogenesis

Urinary tract infections are the main cause of pathogenesis of purple urine bag syndrome. The common microflora that may cause PUBS are Providencia stuartii, Klebsiella pneumoniae, Providencia rettgeri, Proteus mirabilis, Escherichia coli, some enterococcus species like, Pseudomonas aeruginosa, Morganellamorganii etc. apart from that some group B Streptococci and Citrobacter species can cause PUBS too [11]. Mostly the gram-negative bacteria are supposed to cause PUBS. The microflora present in the urinary tract uses tryptophan in their metabolism and produce red and blue pigments as metabolic products. Tryptophan is a common component in the urine which is converted to indole by the biochemical reactions of the micro flora in the urinary tract [9]. Indole secreted into the urine which contains phosphatase and sulphatase produces by several bacteria. Phosphatase and sulphatase convert that indole into indoxylsulfate. The oxidation of indoxylsulfate in the presence of alkaline urine forms indigo (blue pigment) and indirubin (red pigment). These two components

combine with each other in the catheter tubing and form purple color [2]. The interaction between the pigments and the plastic bag catheter along with high bacteria count cause precipitation of PUBS. In absence of oxygen, the indoxyl converts to isatin and gradually in indirubin. Moreover, it can be added in this case that, all the bacteria mentioned above cannot cause PUBS [12]. In some cases, bacteria among same species may not cause PUBS.

The biochemical Pathway of conversion of tryptophan to indigo and indirubin is Figure 1.5.[19]

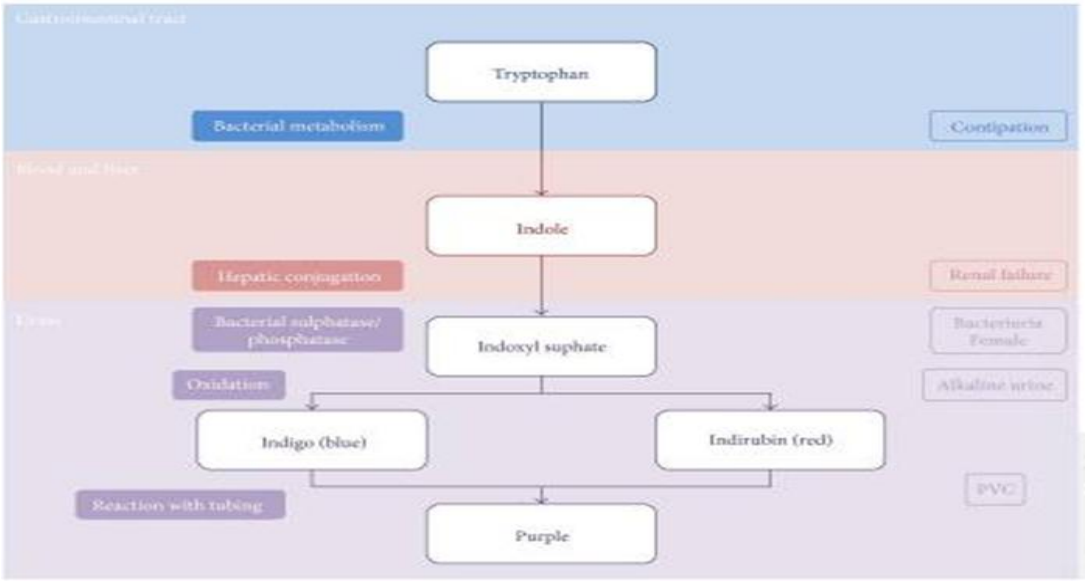


Figure 1.5: Biochemical pathway of conversion of tryptophan to indigo and indirubin.

The Risk of Misdiagnosis

Spot diagnosis can be done to identify PUBS but sometimes it can be misdiagnosed due to clinical unaware. There are several other causes of altered coloration in urine except for PUBS [10]. These causes include haematuria, myoglobinuria, hemoglobinuria, nephrolithiasis, food dyes, urinary tract infections, drugs, porphyria, poisons, and alkaptonuria. Therefore, color alteration in urine may cause due to several other reasons nut due to lack of diagnosis all of the patients with purple colored urine are treated for PUBS. This misdiagnosis can be proved as worst for the patients [6]. Incorporation of wrong drugs may cause several side effects.

Therefore, it is important to take under account that different diagnose can be done from the altered colors of urine. As for example, straw coloration or transparent urine indicates that the person is well hydrated whereas, amber colored urine indicates dehydration. Fizzing of urine or foam in it can be referred to as proteinuria which can be caused by a higher amount of protein intake or renal diseases [5]. Orange colored urine may indicate UTI, dehydration, liver disease, food dye, sulfasalazine, isoniazid, biliary disease, and riboflavin.

On the other hand, red urine can be diagnosed as haematuria. Other causes of urine altered coloration may include, urinary tract information, nephrolithiasis, pyelonephritis, menstruation, BPH, malignancy, renal disease, trauma, catheterization, sickle cell, thalassemia, hemolyticanemia, hemoglobinuria and so on [8]. Besides, some people can be identified to produce drake coloured urine or black urine. This phenomenon is caused due presence of laxatives, iron, methocarbamol, sorbitol etc. urine can be of brown colored due to high rate of dehydration, overdose of some drugs like, paracetamol, metronidazole etc [7]. blue-greencolored urine is produced due to Pseudomonas infection in the urinary tract which is a blue-green alga or because of methylene blue or any food dye present in the urine. Apart from that urine can be colored as white in some cases. White urine indicates, proteinuria, lymphatic fistula, presence of lead or mercury, lipiduriaetc [16]. Some harmless factors may cause altered color of urine like beetroot, carrot or blueberries etc.

The University ofOxford,UK has developed “Oxford Urine Chart” (Figure 2) to reduce the risk of misdiagnosis and quick reference tool for health workers to identify different causes.

Figure 2: Oxford Urine Chart.

Management

Purple urinary bag syndrome poses a high rate of mortality and morbidity because of the urinary tract infections and other factors. Hence, it should be managed properly. Along with UTI, PUBS may cause constipation or other sanitation problems due to the long term use of catheter. Therefore, proper medication should be followed to treat the UTI and catheter should be replaced timely [15]. In this aspect, it can be mentioned that there is no such medication and treatment can be referred to as threat PUBS. Regular change of catheter and maintaining the sanitary measures can help to recover. Hence, the UTI related to the PUBS can be deadly. In some cases, it may cause many other symptoms and can cause malignancy for patients too. Therefore, antibiotics should be taken to treat UTI related to PUBS [4]. Apart from antibiotics indwelling of a catheter for a long time can be harmful too. Therefore, proper safety measures and medication should be prescribed as per the condition of the patients. Moreover, a proper diagnosis should be done. It should be taken under an account that there are several other factors that may cause color alteration of urine [17]. If the disease has not diagnosed properly, the wrong medication can cause severe side effects among the patients.

III. Conclusion

From this discussion, it can be concluded that purple urinary bag syndrome is a rare disease that can be seen among people. A long term indwelling of a urinary catheter can be a major reason for PUBS. This syndrome occurs with a rare phenomenon of purple coloration of urine. There is no such medication for this syndrome. Regular change of urinary catheter and proper sanitation can help to reduce this but the UTI related to this disease can be severe for the patients. Therefore, UTI should be treated with an antibiotic. Some risks factors that have mentioned in the discussion should be taken under consideration during diagnosis of this phenomenon. Moreover, there are several other factors that can cause alter coloration of urine. Therefore, proper diagnosis should be done.

Reference

[1]. Kalsi DS, Ward J, Lee R, Handa A. Purple urine bag syndrome: a rare spot diagnosis. Disease markers. 2017;2017.
[2]. Golzarri MF, Hernaiz-Leonardo JC, Díaz-González A, Velázquez-Acosta C, Vilar-Compte D. Purple urine bag syndrome: An uncommon manifestation of urinary tract infection. Gacetamedica de Mexico. 2017 Jun 15;153(2):273-5.
[3]. Gebrmichael T, Feleke F, Ahmed W, Urella M, Teka S. Purple Urine Bag Syndrome: An Educational Case of a Colorful Condition in the Chronically Catheterized. Marshall Journal of Medicine. 2017;3(3):27.
[4]. Balmes MB, Cruz RS, Zabat GM. Purple Urine Bag Syndrome. Philippine Journal of Nephrology Online. 2018 Apr 26;26(1):14-.
[5]. Pillai BP, Chong VH, Yong AM. Purple urine bag syndrome. Singapore Med J. 2009 May 1;50(5):e193-4.
[6]. WANG IK, Ho DR, Chang HY, LIN CL, CHUANG FR. Purple urine bag syndrome in a hemodialysis patient. Internal Medicine. 2005;44(8):859-61.
[7]. Wong YW, Abdullah N. Purple urine bag syndrome: A startling phenomenon of purple urine in a urine drainage bag. A primary care approach and literature review. Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia. 2018;13(2):42. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6173963/
[8]. Kumar D, Donga N, Macwan R. Purple urine bag syndrome: A scary but easily manageable condition in a patient with prolonged indwelling urinary catheter. Indian journal of palliative care. 2018 Oct;24(4):534. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6199850/
[9]. Karray O, Batti R, Talbi E, Ayed H, Chakroun M, Ouarda MA, Bouzouita A, Cherif M, Slama MR, Amel M, Abdelmoula J. Purple urine bag syndrome, a disturbing urine discoloration. Urology case reports. 2018 Sep;20:57. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6034577/

[10]. Su YJ, Yang HW. Risk factors of mortality in patients with purple urine bag syndrome. Journal of Drug Assessment. 2019 Feb 6(just-accepted):1-. Available at: https://www.tandfonline.com/doi/full/10.1080/21556660.2019.1579727
[11]. Worku DA. Purple urine bag syndrome: An unusual but important manifestation of urinary tract infection. Case report and literature review. SAGE open medical case reports. 2019 Jan;7:2050313X18823105. Available at: https://journals.sagepub.com/doi/full/10.1177/2050313X18823105
[12]. Traynor BP, Pomeroy E, Niall D. Purple urine bag syndrome: a case report and review of the literature. Oxford medical case reports. 2017 Nov 1;2017(11):omx059. Available at: https://academic.oup.com/omcr/article/2017/11/omx059/4584310
[13]. Chung SD, Liao CH, Sun HD. Purple urine bag syndrome with acidic urine. International Journal of Infectious Diseases. 2008 Sep 1;12(5):526-7. Available at: https://www.sciencedirect.com/science/article/pii/S1201971208000726
[14]. Hadano Y, Shimizu T, Takada S, Inoue T, Sorano S. An update on purple urine bag syndrome.International journal of general medicine. 2012;5:707. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/pmc3437914/
[15]. Lin CH, Huang HT, Chien CC, Tzeng DS, Lung FW. Purple urine bag syndrome in nursing homes: ten elderly case reports and a literature review. Clinical interventions in aging. 2008 Dec;3(4):729. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2682405/
[16]. Peters P, Merlo J, Beech N, Giles C, Boon B, Parker B, Dancer C, Munckhof W, Teng HS. The purple urine bag syndrome: a visually striking side effect of a highly alkaline urinary tract infection. Canadian Urological Association Journal. 2011 Aug;5(4):233. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3147034/
[17]. Agapakis DI, Massa EV, Hantzis I, Paschoni E, Satsoglou E. Purple urine bag syndrome: a case report of an alarming phenomenon. Hippokratia. 2014 Jan;18(1):92. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4103055/
[18]. Delgado G, Martínez-Reséndez M, Camacho-Ortiz A. Purple urine bag syndrome in end-stage chronic kidney disease. Brazilian Journal of Nephrology. 2014 Dec;36(4):542-4. Available at: http://www.scielo.br/scielo.php?pid=S0101-28002014000400542&script=sci_arttext
[19]. https://www.ncbi.nlm.nih.gov/core/lw/2.0/html/tileshop_pmc/tileshop_pmc_inline.html?title=Click%20on%20image%20to%20zoom&p=PMC3&id=5727662_DM2017-9131872.001.jpg)[20]Khan F, Chaudhry MA, Qureshi N, Cowley B. Purple urine bag syndrome: An Alarming Hue? A Brief Review of the Literature.Int J Nephrol 2011. 2011 419213

Sood M.A. "The Enigma Of Purple Urine Bag Syndrome, Is It Truly Harmless?." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 3, 2019, pp 85-89.