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Case Report

Milky white urine: a look into the differentials

Robin George Manappallil*

Department of Medicine, National Hospital, Calicut 673001, Kerala, India

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***Correspondence:**
Dr. Robin George Manappallil,
E-mail: drrobingeorgempl@gmail.com

ABSTRACT

Urine analysis is one the simplest means to evaluate renal diseases. Physical and chemical characteristics and microscopic examination provide information regarding the status of kidneys and urinary tracts. The colour, odour, turbidity and specific gravity are the parameters considered under physical examination of urine. This is a case of a 40 year old diabetic lady, who presented with history of dysuria and low grade fever. Her urine was milky white in colour, usually seen in chyluria. On evaluation, she was found to be in sepsis due to urinary tract infection, and her urine analysis was suggestive of pyuria. This form of white urine has rarely been reported with pyuria. This report also looks into the differential diagnosis of white coloured urine.

Keywords: White urine, Chyluria, Pyuria

INTRODUCTION

Urine analysis includes physical, chemical and microscopic examination.[1] Normally, fresh urine is clear in appearance. When the urine sample is left to stand, the phosphates and urates may precipitate out of it, giving it a cloudy appearance. Cloudy urine with a fishy odour is suggestive of pyuria.[2] Milky white urine or albinuria is seen in chyluria.[3] The patient being reported was diagnosed to have pyuria. She had milky white urine, rather than the typical cloudy appearance of pyuria. This report also aims at discussing the differential diagnosis of milky white urine.

CASE REPORT

A 40 year old female presented to Emergency department with history of dysuria and low grade intermittent fever with chills and rigors for the past 10 days, associated with nausea and vomiting. She did not give history of haematuria. There were no other systemic complaints. She is a diabetic on metformin 500mg (twice daily) and glimepiride 1mg (once daily) for the past 2 years. She did not have any significant past medical history.

On examination, she was conscious, oriented, moderately built and nourished. Her heart rate was 100/ minute, blood pressure 90/ 70 mmHg and respiratory rate of 20 breaths/ minute, with saturation 94% (in room air). She was febrile with temperature of 100^0F. On abdominal examination, she had suprapubic tenderness and distended bladder. Other systemic examinations were normal. On insertion of Foley's catheter, about 500ml of milky white foul smelling urine came out in a gush (Figure 1). Though the colour of urine was similar to chyluria, its fishy odour was suggestive of pyuria. Her urine microscopy showed plenty of pus cells, with 10-12 RBC, sugars 2+ and albumin 2+. There were no WBC or RBC casts and crystals. Urinary pH was alkaline. Her urine culture showed heavy growth of Pseudomonas. Her blood investigations showed elevated total counts of 14,300/ cmm (4,000-10,000) and differential counts as

N80 L20, with normal haemoglobin and platelets. Renal functions were deranged with urea 100mg/ dL and creatinine 3.2 mg/ dL, suggestive acute renal failure (prerenal). Her electrolytes, uric acid and liver functions were normal. Ultrasound abdomen and pelvis was suggestive of cystitis, with kidneys having well maintained corticomedullary differentiation. Viral markers (HIV, HBsAg and Anti HCV) and filarial antigen were negative. Her peripheral smear did not show any parasites. Urinary triglycerides were less than 10 mg/ dL and 24 hour urine protein was about 800 mg. Urinary eosinophils were absent and ketone bodies were 2+. Her random blood sugar was 204 mg/dL and serum β hydroxybutyrate was normal. Her TSH, lipid profile, ECG and chest X-ray were normal.

Figure 1: Milky white urine due to pseudomonas pyuria.

She was started on injection meropenum (which was also sensitive as per culture reports) and hydrated with normal saline. Following 2 days of treatment, her total counts came down to 6900/ cmm; and urea and creatinine improved to 56 and 1.4 mg/ dL respectively. The patient was discharged after 7 days of antibiotic therapy. One week following discharge, a repeat urine microscopy and renal function test; and cystoscopy were done, all of which were normal.

DISCUSSION

Urine analysis, comprising of physical, chemical and microscopic examination, forms one of the basic tests to assess kidney disease. Early morning midstream samples are usually recommended. Patients are also advised to avoid strenuous activity for 3 days prior to sample collection. In case of women, urine analysis is avoided during menstruation period in view of blood contamination.[4]

The physical characteristics taken into account are colour, turbidity, odour and specific gravity. Normal urine is transparent. Depending on the amount of urobilin, the colour of urine ranges from pale to dark yellow. Drugs like rifampicin, phenytoin, nitrofurantoin etc can also cause a wide range of urinary discoloration. Several pathological conditions can give rise to changes in urine colour. Some of these are mentioned below:

- ***Hematuria, hemoglobinuria, myoglobinuria:*** red or black urine
- ***Jaundice:*** dark yellow urine
- ***Chyluria:*** white milky urine
- ***Uric acid crystalluria:*** pink urine
- ***Urinary tract infection with E. coli:*** velvet urine
- ***Porphyrinuria, alkaptonuria:*** red urine turning black on standing

Turbid urine is suggestive of urinary tract infection, severe hematuria and presence of genital secretions. Pungent odour of urine is seen in bacterial urinary tract infections, while fruity odour is associated with presence of ketones. Other conditions with characteristic odours are maple-syrup urine disease (maple syrup odour), phenylketonuria (musty odour), hypermethioninemia (fishy odour) and isovaleric acidemia (sweaty feet odour). Specific gravity (SG) takes into account the number and weight of dissolved particles in urine. It ranges from 1.000 to 1.060. The conditions corresponding to the changes in SG are:

- SG 1.000 – 1.003: diabetes insipidus
- SG 1.010: acute tubular necrosis, chronic kidney disease
- SG >1.040: presence of extrinsic osmotic agent like contrast material.[1]

Milky white urine, otherwise called albinuria is seen only in a hand full of conditions. The most common among these is chyluria. The presence of chyle in urine following an abnormal communication between lymphatics and the urinary tract, gives it the milky white colour. It is seen in filariasis due to *Wuchereria bancrofti*. These parasites lodge in the lymph channels and cause obstruction in the drainage of intestinal lymph, resulting in lymphatic vessel dilatation and rupture into the urinary tract. Chyluria has also been associated with fungal infections, malignancy, trauma, pregnancy and congenital abnormalities of lymphatic vessels.[5-7]

The term urinary tract infection (UTI) comprises of asymptomatic bacteriuria, cystitis, prostatitis and pyelonephritis. It is more common in females than males. The use of diaphragm with spermicide, frequent sexual intercourse and diabetes are risk factors for UTI in females. The incidence of UTI increases in males with prostatic hypertrophy. About 75-90% of the cases of UTI are due to *E. coli* while the remaining are caused by *Staph aureus*, *Klebsiella*, *Proteus*, *Enterococcus*, Citrobacter and other organisms. Dysuria, urinary frequency, suprapubic pain, hematuria and nocturia are seen in cystitis. These symptoms may be associated with fever. The presence of pus in the urine gives its white

colour. With regard to cystitis, urine microscopy reveals pyuria in almost all cases and haematuria in about 30% of cases. Urine culture is considered as the diagnostic gold standard for UTI.[8]

Hyperuricosuria, seen in hyperuricemia due to excessive intake of meat and fish, is defined as the presence of excess amounts of uric acid in the urine (>800 mg/day in males and 750 mg/day in females). The presence of more than 1.3 grams of phosphate in 24 hour urine sample is termed as phosphaturia. It is seen in hyperparathyroidism and Vitamin D intoxication, and by consuming foods rich in phosphates (milk, cheese, organ meats, fish). In both these conditions, when the urine sample is allowed to stand, it gets a cloudy colour due to urate and phosphate precipitates.[1]

Increased excretion of oxalic acid (>50 mg/day) in urine (hyperoxaluria) can also give rise to white urine. It is associated with conditions like Crohn's disease, chronic pancreatitis, bowel resection, intestinal bypass surgery, cystic fibrosis and certain genetic disorders (primary hyperoxaluria). Foods like spinach, nuts and chocolate are rich in oxalate. Low calcium diet can promote hyperoxaluria, as very little calcium is available for binding with oxalate in the intestine.[9]

Proteinuria, defined as excessive albumin excretion in urine, is any early indicator of kidney disease. The urine in such patients is foamy white. Also following a fatty meal, the urine can be white in colour due to presence of lipids (lipiduria).

In this case, the patient presented with milky white urine which had a foul odour. Though the urine colour was typical of chyluria, the patient was diagnosed to have pyuria due to cystitis following Pseudomonas infection. Such an intense milky white appearance of urine in urinary tract infection is a rare sight.

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