

# Diagnosing Etiology by Urine Microscopy in Sudden Spurt of Acute Kidney Injury Cases: Going Back to the Basics

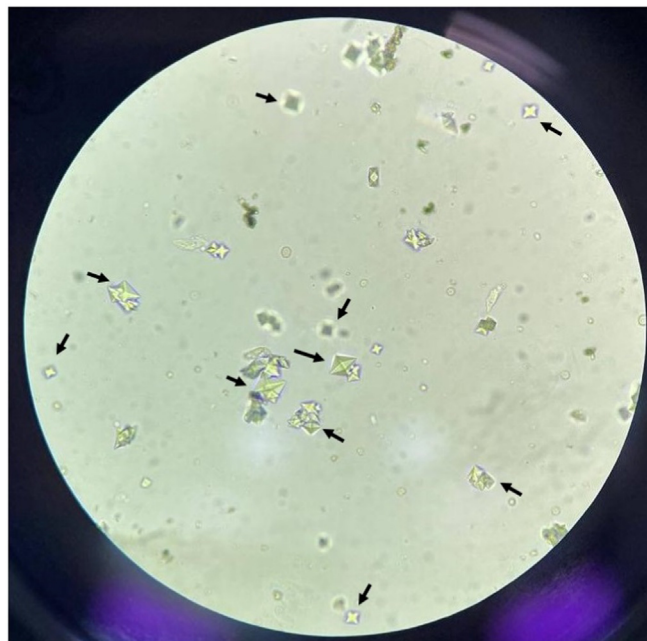


**To the Editor:** Recently, a sudden rise in acute kidney injury in children has been reported from Indonesia, Gambia, and a few other countries.<sup>1</sup> The suspected cause of these cases appeared to be from adulteration of cough, cold, and fever medications with diethylene glycol and ethylene glycol in place of the more expensive, nontoxic solvent glycerol.<sup>1,2</sup> The metabolite of these adulterants leads to the formation of oxalic acid and calcium oxalate monohydrate or dihydrate crystals leading to oliguric and anuric acute kidney injury and cerebral edema.<sup>3,4</sup>

We describe here a recent representative case, one of many of such cases in Uzbekistan, and the role of urine microscopy in diagnosing the etiology in such cases. This 5-year-old girl presented to the hospital with a history of flu-like symptoms with high grade fever, cough, and cold for 4 days, altered sensorium and complete anuria since day 1. All such children had taken paracetamol and cough syrup of the same brand. The medications for fever and cough were taken 3 times a day, 4 days before anuria and altered mental status. The child required daily hemodialysis and mechanical ventilation.

Laboratory evaluation showed disproportionate severe metabolic acidosis, high osmolar gap, evidence of severe acute kidney injury, and elevated aspartate aminotransferase, alanine transaminase and lactate dehydrogenase >10 times the normal range. The child's urine examination is shown in Figure 1. Typical clinical presentation, laboratory evidence of high osmolar gap, and the urine microscopy confirmed the diagnosis of suspected diethylene glycol adulteration. This child needed hemodialysis and supportive care for anuric acute kidney injury, which resolved in 4 weeks with a normal serum creatinine and no proteinuria on follow-up at 6 months.

Calcium oxalate crystals may appear in urine as rods or in a classic "dumbbell" appearance in the monohydrate form, whereas the dihydrate crystals appear as envelope like structures, as seen in our representative case (Figure 1). The calcium oxalate crystals are not



**Figure 1.** Urine examination (×40) showing the characteristic calcium oxalate dihydrate crystals in the child with unexplained acute kidney injury.

dependent on the urine pH.<sup>1–4</sup> Although classically, monohydrate crystals are pathognomonic in such cases, the dihydrate forms should also raise a suspicion as in our case. Although confirmatory evidence of the nature of the crystals is performed by x-ray crystallography, urine microscopy may serve as an important tool to diagnose such unusual cases in the absence of availability of serum ethylene glycol estimation or kidney biopsy evidence.

## DISCLOSURE

All the authors declared no competing interests.

## PATIENT CONSENT

Informed consent was obtained from the patient's parents before publishing the image.

- Umar TP, Jain N, Azis H. Endemic rise in cases of acute kidney injury in children in Indonesia and Gambia: what is the likely culprit and why? *Kidney Int.* 2023;103:444–447. <https://doi.org/10.1016/j.kint.2022.12.004>
- Hanif M, Mobarak MR, Ronan A, Rahman D, Donovan JJ Jr, Bennish ML. Fatal renal failure caused by diethylene glycol in paracetamol elixir: the Bangladesh epidemic. *BMJ.* 1995;311:88–91. <https://doi.org/10.1136/bmj.311.6997.88>
- Alkahtani S, Sammons H, Choonara I. Epidemics of acute renal failure in children (diethylene glycol toxicity). *Arch Dis Child.* 2010;95:1062–1064. <https://doi.org/10.1136/adc.2010.183392>
- Jha V, Chugh KS. Nephropathy associated with animal, plant, and chemical toxins in the tropics. *Semin Nephrol.* 2003;23:49–65. <https://doi.org/10.1053/snep.2003.50003>

Nodira Murtalibova<sup>1</sup>, Sidharth Kumar Sethi<sup>2</sup>,  
Jakhongir Tojiboev<sup>1</sup>, Kritika Soni<sup>3</sup> and  
Rupesh Raina<sup>4</sup>

<sup>1</sup>Department of Pediatric Nephrology, National Children's Medical Center, Tashkent, Uzbekistan; <sup>2</sup>Pediatric Nephrology, Kidney Institute, Medanta, The Medicity, Gurgaon, Haryana, India; <sup>3</sup>Department of Internal Medicine, Dr. D. Y. Patil Medical College, Hospital & Research Centre, Pune, Maharashtra, India; and <sup>4</sup>Pediatric Nephrology, Akron Children's Hospital, Cleveland, Ohio, USA

**Correspondence:** Nodira Murtalibova, Department of Pediatric Nephrology, National Children Medical Center, Tashkent, Uzbekistan. E-mail: [nodira0610@gmail.com](mailto:nodira0610@gmail.com)

**Received 9 May 2023; revised 31 May 2023; accepted 5 June 2023; published online 10 June 2023**

*Kidney Int Rep* (2023) **8**, 1696–1697; <https://doi.org/10.1016/j.ekir.2023.06.006>

© 2023 International Society of Nephrology. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).