Postgraduate Journal of Pediatrics and Adolescent Medicine
Volume 3, Issue 1 - 2026 , Pg. No. 10-12
Peer Reviewed & Open Access Journal

Case Report

The Neonatal Enigma: Unravelling the Mystery of Cola-Coloured Urine

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How to cite this article:
Kumar R, Hamsika V, Ahmed A. The Neonatal Enigma: Unravelling the Mystery of Cola-Coloured Urine. Postgrad J Pediatr Adol Med. 2026;3(1): 10-12.

Date of Submission: 2025-03-21
Date of Acceptance: 2025-04-02

A B S T R A C T

A 12-hour-old neonate was brought to the pediatrics emergency department with respiratory distress since birth and cola-colored urine noted at admission. The patient had no other bleeding manifestations, and the coagulation profile was normal. POCUS revealed that the umbilical catheter was positioned in the umbilical artery instead of the umbilical vein. The umbilical catheter was immediately removed, and peripheral access was secured. The hematuria resolved over the next twelve hours. The temporal association of the event suggested that the cause of hematuria was inadvertent umbilical artery catheterization leading to renal artery occlusion. Our case highlights the role of POCUS in rapid confirmation of central line position, especially in patients with circulatory collapse.

Keywords: Umbilical venous catheterization, POCUS, Umbilical artery catheterization, Neonatal Haematuria

Introduction

Central venous lines (CVLs), including umbilical venous catheters (UVCs) and peripherally inserted central catheters (PICCs), are widely utilized in neonatal intensive care units (NICUs) for fluid and medical administration. UVCs are inserted without direct visualization and are positioned using either a shoulder-to-umbilicus length reference chart or a weight-based calculation, such as Shukla's formula.

Inadvertent umbilical arterial catheterization occurs in approximately 25% of the cases and is frequently clinically silent. Hematuria is observed in about 24% of such cases and may represent the only clinical sign, while aortic thrombosis is observed in 26% of the cases. Amongst infants with hematuria, 62% have clot localization, while 25% do not develop clot formation.[1,2]

Conventionally, X-rays are used to determine the position of the UVC tip by assessing its relation to the vertebral column, liver shadow, and cardiac silhouette; however, this approach is limited by indirect visualization and potential inaccuracy. This approach is limited by indirect visualization, and potential in POCUS and echocardiography has recently emerged as a superior alternative for catheter tip localization accuracy. POCUS enables real-time visualization and offers several benefits, including the absence of radiation exposure, minimal training requirements, reduced handling of the neonate, detection of catheter migration, and the ability to reposition central lines under direct USG guidance.[3]

Case report

A 12-hour-old, term female newborn with a birth weight of 2700 g was brought to the pediatric emergency department of a tertiary care center from a private nursing home with a history of delayed cry at birth and weak respiratory efforts. On initial assessment, the newborn appeared ill, lethargic, pale, and with poor respiratory effort along with mottled skin. The baby received initial resuscitation with intravenous fluids, medications, and oxygen therapy prior to referral to our center for further management. On examination, pulse rate was 161/min,

RR 54/min, and SpO_2 86% on room air with an umbilical line in situ. Baby had reduced activity and hypotonia with diminished reflexes. Chest examination revealed equal air entry on both sides without crepitations. The abdomen was soft and non-distended, with an orogastric tube and umbilical line in place; however, the umbilical stump was meconium-stained. The external genitalia were normal female, and a urinary catheter was in situ, with cola-colored urine noted in the collection bag.

Provisionally a diagnosis of a term singleton female with perinatal asphyxia and severe hypoxic-ischemic encephalopathy (HIE-III) with meconium aspiration syndrome (MAS) was made. The possibility of acute tubular necrosis due to birth asphyxia, a generalized bleeding disorder, or renal vascular thrombosis was considered for cola-colored urine. Investigations revealed a hemoglobin of 18.1 g/dL, a total leukocyte count (TLC) of 21,000/mm^3, and a platelet count of 390,000/mm^3. Blood urea and serum creatinine were 23 mg/dL and 0.7 mg/dL, respectively. Electrolytes showed sodium 141 mEq/L, potassium 4.8 mEq/L, and calcium 7.4 mg/dL. Bilirubin levels were 2.1 mg/dL (total) and 0.2 mg/dL (direct). ALP was 274 U/L, SGOT/SGPT were 42/28 U/L, and RBS was 103 mg/dL. The PT/INR was 12.3/1.1, and urine microscopy revealed numerous red blood cells (RBCs). POCUS demonstrated no gross renal anomalies or pelvicalyceal obstruction, and the urinary catheter was visualized in place, within the bladder. However, the umbilical line catheter was noted to be inadvertently positioned within the umbilical artery, which was confirmed following administration of a bolus (Figure 1). The umbilical artery catheter was immediately removed. Subsequently, the Doppler study showed no thrombus formation, and hematuria resolved within the next 24 hours. The cause of the hematuria was found to be inadvertent umbilical artery catheterization, leading to transient vasospasm of the adjacent renal artery near the bifurcation and branching of renal vessels.

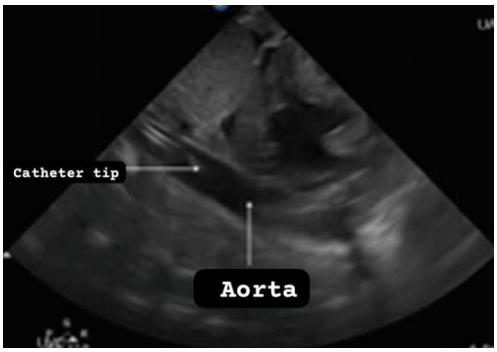

Figure 1.Catheter tip in the abdominal aorta as seen by point of care ultrasound

Discussion

Umbilical venous catheterisation is one of the most frequently performed invasive procedures in neonatal intensive care units. The procedure is traditionally performed blindly following visual inspection of the cord stump and identification of the umbilical vessels. However, umbilical venous catheterization is frequently associated with catheter mal-position, which is confirmed by initial radiographs in approximately 78.8% of cases.[3,4] Inadvertent catheterization of the umbilical artery occurs in nearly one-fourth of cases. Haematuria is observed in 24% of cases and can sometimes be the only sign. Aortic thrombosis occurs in about 26% of cases. Among infants with haematuria, 62% exhibit clot localization.[3-5] Other potential risks involve air embolism, bleeding, vascular compromise, and infections.[1,5]

Point of care ultrasound is a superior alternative to radiographic imaging for confirmation of umbilical catheter position. It offers the additional advantage of real-time assessment without exposure to ionizing radiation. Using POCUS, the procedure has a high success rate of 97.3% in accurately locating the catheter tip, whereas post-procedure radiographic imaging achieves a lower success rate of 75%.[3] Further advantages of POCUS include the ability to obtain real-time measurements, ensuring accuracy and immediate feedback. The technique is reproducible, allowing consistent results across assessments, and repeatable, enabling serial or daily evaluations when required. Importantly, it eliminates radiation exposure, making it a safer alternative to conventional radiographic methods.[3,5-7]

Conclusion

The temporal association of events strongly suggests that the hematuria in this case was caused by inadvertent placement of the catheter into the umbilical artery. This case further highlights that point-of-care ultrasound (POCUS) proves to be a superior, more accurate, safer, and cost-effective technique for central line localization.

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