Pediatric Oncall Journal
Volume : 23, Issue 3:179-180
DOI: https://doi.org/10.7199/ped.oncall.2026.94

TEACHING FILES (GRAND ROUNDS)

MISDIRECTED UMBILICAL VENOUS CATHETER IN A NEONATE: A CASE REPORT AND ANATOMICAL REVIEW

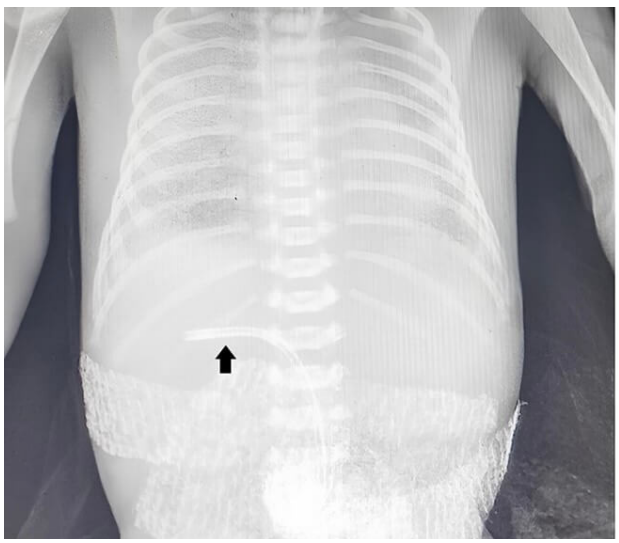
Nivetha R, Aiswarya R, Gobinathan S, Kumaravel K S.
Department of Pediatrics, Govt. Mohan Kumaramangalam Medical College, Salem, India.

ARTICLE HISTORY
Received 26 January 2026
Accepted 26 March 2026

KEYWORDS
Neonate, Umbilicus, Catheter.

Clinical Problem:
A preterm male neonate, born at 34 weeks of gestation, by emergency cesarean section, with a birth weight of 1.8 kg, presented with severe respiratory distress and required central line placement for intensive care management. An umbilical venous catheter (UVC) was planned and the insertion length was calculated using Shukla's formula. The UVC was placed under aseptic precautions with an F4 umbilical catheter. Position was clinically confirmed by free flow of blood in either direction. An abdominal X-ray was obtained to confirm the UVC position, which showed the UVC tip in the left portal vein (Fig 1A). The UVC was promptly removed and vascular access was secured through a peripheral vein.

Fig 1A - X -ray of the neonate with an umbilical venous catheter in the left portal vein (arrow).

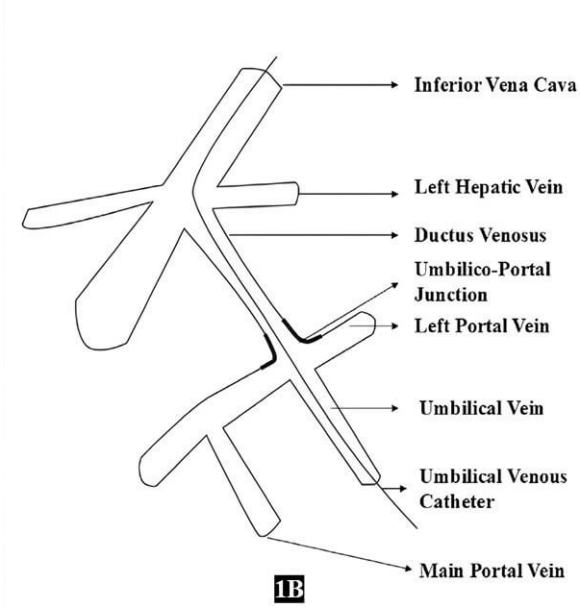


Address for Correspondence: K.S.Kumaravel, 191A, Shankar Nagar, Salem, Tamil Nadu, India. PIN: 636007.

Email: kumaravelks@rediffmail.com

©2026 Pediatric Oncall

Fig 1B – Anatomy of umbilical and portal venous communication.



Describe the correct course of the umbilical venous catheter?

Discussion
Securing a central venous line is an important step in the management of critically ill neonates in a Neonatal Intensive Care Unit (NICU). A UVC provides rapid, secure central venous access and can be placed by trained clinicians. A UVC also plays an important role in ongoing intensive care, including the administration of fluids, drugs, parenteral nutrition and blood products. However, UVC is also associated with rare complications. These include sepsis, cellulitis, hepatitis, liver abscess, infective endocarditis and cardiac tamponade.[1] These complications can be minimized by adhering to aseptic precautions and confirming the UVC tip position radiologically. The major challenge in correct UVC placement is estimating the insertion length. Although many formulas are available to calculate the insertion length, none is accurate.[1]

In fetal life, the umbilical vein communicates with the

left branch of the portal vein at the umbilico-portal junction and continues as the ductus venosus, which joins the hepatic vein and drains into the inferior vena cava (IVC) (Fig 1B).[2] When correctly positioned, a UVC follows this anatomical path: it enters through the umbilicus, traverses the umbilical vein, passes through the ductus venosus and then enters the hepatic vein, ultimately reaching the inferior vena cava (IVC). A sphincter-like structure is present at the origin of the ductus venosus and its contractility may be influenced by inotropes and by changes in neonatal blood pressure. These factors may prevent passage of the catheter through the ductus venosus, resulting in misdirection of the UVC into the left portal vein.

Confirming the position of a UVC is more than a standard protocol; it is an important step to prevent serious complications. Radiologically confirmed UVC tip placement helps protect neonates from avoidable complications. The optimal location of the UVC tip is at the inferior vena cava–right atrial junction, corresponding radiographically to the T7–T9 vertebral level.[3] Placement of the UVC away from this position can lead to infusion of drugs and parenteral nutrition containing hyperosmolar solutions into unintended vascular territories, increasing the risk of organ injury to the liver or heart. Conventional radiography has long been the standard for confirming UVC position, using vertebral landmarks as reference points. Point-of-care ultrasonography is increasingly favored, as it allows visualization of the catheter tip, ductus venosus and hepatic vessels, thereby enhancing diagnostic precision and avoiding irradiation.[4] Once misdirection is identified, prompt removal or repositioning of the catheter is essential. In many instances, timely removal alone leads to clinical and biochemical improvement, highlighting the reversibility of complications when addressed early. Few studies have demonstrated that real-time ultrasound-guided placement of the UVC helps in accurate localization of the catheter tip and reduces reinsertions and removals.[5]

Compliance with Ethical Standards

Funding: None
Conflict of Interest: None

References:

1. DedeepyaV, MounicaG, SravanthiNL, SumasreeA, LakshmiBV. Accuracy of Shukla's formula for depth of insertion of umbilical venous catheter. Int J Contemp Pediatr 2023;10:463-7.
2. Uberoi PM, Sondhi M, Devaskar UP. Misplaced Neonatal Umbilical Venous Catheter: Double Catheter Technique Revisited. Cardiol Vasc Res. 2022; 4(2): 1-3.
3. Al-Dajani N, Osiovich H, Smyth J, Byrne A, Jamieson D, Kaczala G. Umbilical Venous Catheter Position: The Value of Acquiring a Lateral in Addition to a Frontal Chest Radiograph. Cureus. 2023 Oct 7;15(10):e46642.
4. Stewart DL, Elsayed Y, Fraga MV, Coley BD, Annam A, Milla SS. Use of point-of-care ultrasonography in the NICU for diagnostic and procedural purposes. Pediatrics. 2022 Dec 1;150(6):e2022060053.
5. Sharma D, Farahbakhsh N, Tabatabaii SA. Role of ultrasound for central catheter tip localization in neonates: a review of the current evidence. J Matern Fetal Neonatal Med. 2019 Jul;32(14):2429-2437.