

# Umbilical Vein Catheterization - When Complications Occur A Case Report

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## ABSTRACT

*Although umbilical venous catheterization is a routine procedure in premature newborns, it is associated with various, potentially life threatening, complications. We present a case of a premature baby diagnosed with a hepatic parenchymal liquid collection as a complication of umbilical vein catheterization in our Neonatal Intensive Care Unit.*

*The child was born in the 25<sup>th</sup> gestational week (GW) and was doing well until the 12<sup>th</sup> day of life when his general condition deteriorated. He appeared anxious and his oxygen saturation (SaO<sub>2</sub>) decreased. There was slight abdominal distension and tenderness over the abdominal wall, with weak bowel movements, and a palpable liver. Abdominal ultrasound (US) showed an enlarged liver with a well-defined hypoechoic area, with inhomogeneous echogenicity. Such findings were suggestive of fluid extravasation to the liver through a malpositioned umbilical venous catheter. The umbilical catheter was withdrawn, antimicrobial treatment initiated, and eventual complete regression of the collection was seen eleven days after extravasation. Rapid, unexplained clinical deterioration of a newborn with an umbilical vein catheter should always raise the suspicion of a complication due to catheterization. Such a catheter should be carefully revised and, if there is any doubt, removed. Timely diagnosis and adequate treatment is essential, and potentially life-saving.*

**Key words:** newborn, umbilical vein catheterization, complication, malposition, liver

## Introduction

Umbilical venous catheters are commonly used for vascular access in premature newborns. (1) Although catheterization is a routine procedure, it is associated with various, potentially life threatening, complications. Anomalous positioning of the umbilical venous catheter is due to insertion without imaging guidance. (2) A potential complication is a hepatic hematoma, often followed by fluid collection, as the result of perforation of the intrahepatic vascular wall by the catheter. (3) It has been suggested that such a collection could be misdiagnosed as a tumorous growth leading to unnecessary diagno-

stic evaluation. (4) We present a case of a premature baby diagnosed with a hepatic parenchymal liquid collection as a complication of umbilical vein catheterization in our Neonatal Intensive Care Unit.

## Case report

Newborn male patient, L.K. (patient identity number: 17852), was born prematurely to a second gravida (her first child was born at 25 weeks gestation (GW), and died within the first day of life (DOL)). The second child was born at 25+6 GW by vaginal delivery, with occipital presentation, birth weight 1090 g, birth length 37 cm, head circumference 25 cm, and Apgar score of 5/6. After birth, the newborn initiated spontaneous respiration, the heart rate was normal (a systolic murmur was

heard), there were multiple hematomas covering roughly half of the skin. The child was intubated, and received prophylactic surfactant therapy (on chest x-ray there were no signs of respiratory distress syndrome). An umbilical venous catheter was placed and fresh frozen plasma administered. The position of the tip of the umbilical venous catheter was confirmed by chest and abdominal x-ray, and it was positioned beneath the lower rim of the 11<sup>th</sup> left rib. Due to increased blood markers of infection (C-reactive protein, leukocytes), empirical antibiotic therapy was introduced (ampicillin, gentamicin) on the 2<sup>nd</sup> DOL. On the 2<sup>nd</sup> DOL, parenteral nutrition was commenced in addition to enteral. On the 12<sup>th</sup> DOL, the patient's general condition deteriorated. His skin color was pale-grayish,

he appeared anxious, oxygen saturation (SaO<sub>2</sub>) decreased, there was slight abdominal distension and tenderness over the abdominal wall, with weak bowel movements, and a palpable liver (2 cm below the costal margin). Abdominal ultrasound (US) showed an enlarged liver with a well-defined hypoechoic area with inhomogeneous echogenicity, measuring 33 x 28 mm located within the right lobe of the liver (figure 1).

Such findings were suggestive of fluid (parenteral nutrition) extravasation to the liver. The umbilical catheter was withdrawn and antibiotic and antimicrobial treatment initiated (meropenem, vancomycin, diflucan). Laboratory tests performed showed normal markers of infection, and slightly increased levels of liver enzymes which gradually decreased.

All microbiological samples collected during the hospital stay were sterile. Follow-up US examinations of the abdomen showed a reduction in the size of the abnormal fluid collection in the liver (5 days later it measured 24 x 14 mm) and eventual complete regression eleven days after the extravasation (figure 2).

The patient was discharged in a good general state.

## Discussion

The advantages of central vein catheters over peripheral vein lines are well known. The umbilical vein is usually the most accessible central vein in the newborn, thus making umbilical vein catheterization a common procedure in Neonatal Intensive Care Units. (5) However, the procedure itself is associated with multiple potential complications, most of them being due to incorrect placement of the tip of the cannula. (4) The position should always be assessed radiologically with a chest and abdominal x-ray. (2) After being introduced, the catheter often moves towards the liver, through the portal vein where it should be removed without delay. (6,7) Incorrect positioning of the umbilical catheter in the portal vein may lead to infusion of hypertonic fluids into



**Figure 1. Ultrasound findings: a well-defined hypoechoic area with inhomogeneous echogenicity, measuring 33 x 28 mm located within the right lobe of the liver.**



**Figure 2. Follow-up ultrasound findings: complete regression of the hypoechoic area with inhomogeneous echogenicity. Normal ultrasound of the liver.**

the liver and considerable damage to the liver parenchyma. (7) Depending on the type of fluid and elapsed time, these collections may appear as anechoic, heterogeneous or echoic structures on abdominal US. (8) Often its diag-

nosis requires wide diagnostics and the cooperation of many specialists to exclude other potential pathologic conditions (abscesses, hamartoma, hepatoblastoma). (4) In our case, during abdominal ultra-

sound on the 12<sup>th</sup> DOL, within the well-defined hypoechoic area in the right liver lobe, the authors of this paper were able to notice certain movement. Such movement in real-time examination during parenteral feeding through the umbilical catheter convinced us that it was fluid extravasation within the liver parenchyma that caused the deterioration in the patient's condition. After immediate removal of the catheter, antimicrobial therapy was introduced as the only treatment. Repeated abdomi-

nal US five days later revealed the structure decreased in size, and the patient's condition significantly improved.

We believe that the catheter was displaced in the course of nursing care, as a result of its poor fixation. It would have been prudent if we had attempted to evacuate some of the fluid from the hepatic collection through the catheter before its removal since it would most probably have reduced the time to complete recovery. However, at that point in time, we did not consider that

option. Nevertheless, conservative therapy appeared to be sufficient in this case, and there was no need for further diagnostic and/or therapeutic procedures. Rapid, unexplained clinical deterioration in a newborn with an umbilical vein catheter should always raise the suspicion of a complication of umbilical catheterization. Such a catheter should be carefully revised and, if there is any doubt, removed. Timely diagnosis and adequate treatment is essential, and potentially life-saving.

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