Liver Infarction After Umbilical Vein Catheterization  
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Introduction

Umbilical vein catheterization can be a lifesaving measure in neonates after birth who need immediate intravascular access when alternative access is unavailable. Complications of umbilical catheterization include arterial injury, venous injury, hypovolemia due to hemorrhage from the cord, infection, dysrhythmia, portal vein thrombosis, and liver damage due to direct catheter trauma or infusion of solutions damaging to the liver parenchyma. It is best practice to advance the catheter only 2-3 cm beyond the point of good blood return or confirm with x-ray that the tip is above the diaphragm to avoid injection of hypertonic solutions that can cause liver necrosis.

Case Description

A 39 week PCA newborn presented to the University of Chicago from an outside hospital after birth. The pregnancy was unremarkable except for evidence of polyhydramnios prior to delivery. The patient was born via c-section due to failure to progress. Upon delivery, the patient was noted to be cyanotic without respiratory effort and extremities were noted to be stiff. The patient was subsequently intubated and required resuscitation with epinephrine and chest compressions. An umbilical venous catheter was placed during the resuscitative effort and secured at 6cm. The patient was then transferred to our institution for further care.

Upon arrival a babygram was performed and the umbilical venous catheter line was noted to have its tip at the level of the umbilical vein. The line was advanced by the NICU team. On day 8, patient’s abdomen was noted to be hard on exam. An ultrasound was obtained which showed moderate ascites.

The pediatric surgery team was consulted. A CT scan of the abdomen showed a multi-lobulated, loculated collection of fluid, dense contrast, and air measuring up to 4.4 cm within the liver.

Abdominal X-ray and Abdominal CT

Anatomy and Correct Placement of Umbilical Venous Catheter

Some contrast extended along the hepatic capsule. Additional subcapsular hypoattenuating crescent shaped lesions suggested subcapsular extension of abscess. Findings were strongly suggestive of a complication of the umbilical venous catheter, whose tip was found to be in the liver. The patient was brought to the operating room and found to have an area of infarction and hematoma on the anterior aspect of the right lobe of the liver. The hematoma and necrotic liver were evacuated.

Discussion

Umbilical catheter cannulation was first described in 1947 for exchange transfusion treatment for severe indirect hyperbilirubinemia. Since that time it has become one of the most commonly performed procedures in the neonatal intensive care units for venous access in resuscitation or when other access is difficult to obtain.

Correct placement is critical. The tip of the UVC should be positioned at the junction of the inferior vena cava and right atrium to ensure central venous placement. This is approximated at the T8-T9 position on chest x-ray. It is important to monitor position as this may be displaced at any time, particularly with variations in abdominal girth.

Incorrect positioning of the UVC in the liver is associated with increased risk of abscess, liver laceration, or portal thrombosis. Hyperosmolar solutions like TPN may result in focal hepatic necrosis if the UVC tip is intrahepatic.

Conclusion

Umbilical vein catheterization is not without potential complications. A provider should confirm location of the tip of the catheter prior to utilization. Anesthesia providers should have a low threshold for placing alternative venous access devices when a patient with an umbilical venous catheter presents to the operating room for surgery.

References