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Rare Complıcatıon of Umblıcal Venous Catheter In Newborn: Lıver Hematoma

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Abstract

Umbilical vein catheterization (UVC) is one of neonatal intensive care units' most common bedside procedures. Complications of umbilical vein catheterization include thrombus formation, embolism, vessel rupture, bleeding, and infection. In neonates, liver hematoma and abscesses caused by incorrect placement of the umbilical vein catheter are rare lesions. In our case, we presented a case of hepatic hematoma as a rare complication of an umbilical vein catheter.

Keywords: Newborn, Liver Hematoma, Umbilical vein catheterization

Introduction

Umbilical vein catheterization (UVC) is a rapidly accessible and safe method used for many procedures such as blood sampling, intravenous drug and fluid administration, total parenteral nutrition, exchange transfusion, blood product replacement, blood pressure monitoring, and resuscitation in new-born infants. Umbilical vein catheterization was first used in 1947 in a patient who underwent an exchange transfusion due to hyperbilirubinemia **[1]**. However, various complications may occur after catheterization of the umbilical vessel, including infection, thrombosis, and perforations anywhere along the catheter path. Liver complications can be seen depending on the placement of the umbilical venous catheter (UVC). These complications range from benign hematomas to hepatic abscesses, ascites, and hepatic perforation **[2,3]**. In light of the literature, we wanted to present our patient, who developed hepatic hematoma due to umbilical vein catheterization after being followed up for respiratory distress and ventriculomegaly.

Case Presentation

A 3020-gram baby born by cesarean section at 38 weeks of gestation from a 38-year-old mother was admitted to our neonatal unit due to respiratory distress. The patient's 1st and 5th-minute Apgar were 5-7, respectively. The patient with respiratory distress was taken to mechanical ventilator support in nasal respiratory support. Dandy Walker's malformation was detected in the cranial ultrasonography of the patient, who had a history of ventriculomegaly in his prenatal follow-ups. He was followed up on head circumference and postnatally weaned from the mechanical ventilator on the seventh day. An umbilical venous catheter was inserted in the patient, who had a long history of hospitalization and an operation due to hydrocephalus. In the direct radiographs of the patient taken during the hospitalization, it was observed that the catheter curved over time **(Figure 1a/1b)**. On the eleventh day of his hospitalization, abdominal distention developed, and capillary blood circulation deteriorated.

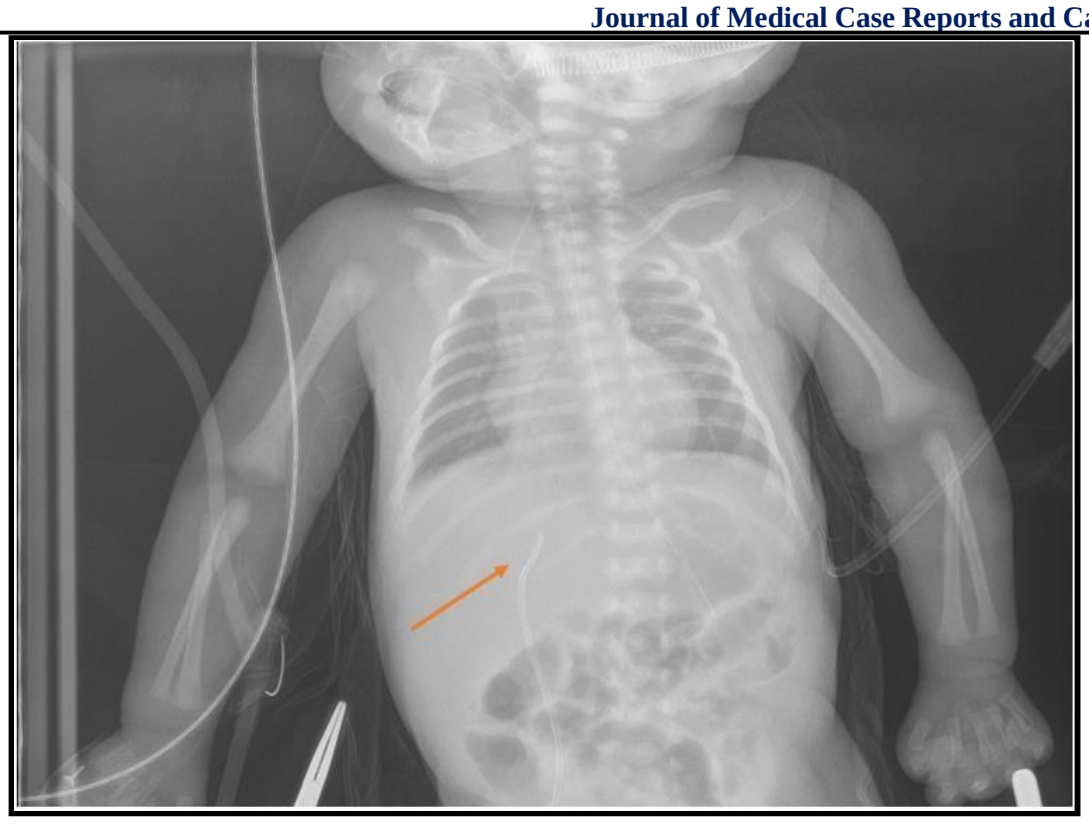

Figure 1a: Direct radiography image of the first insertion of the umbilical vein catheter

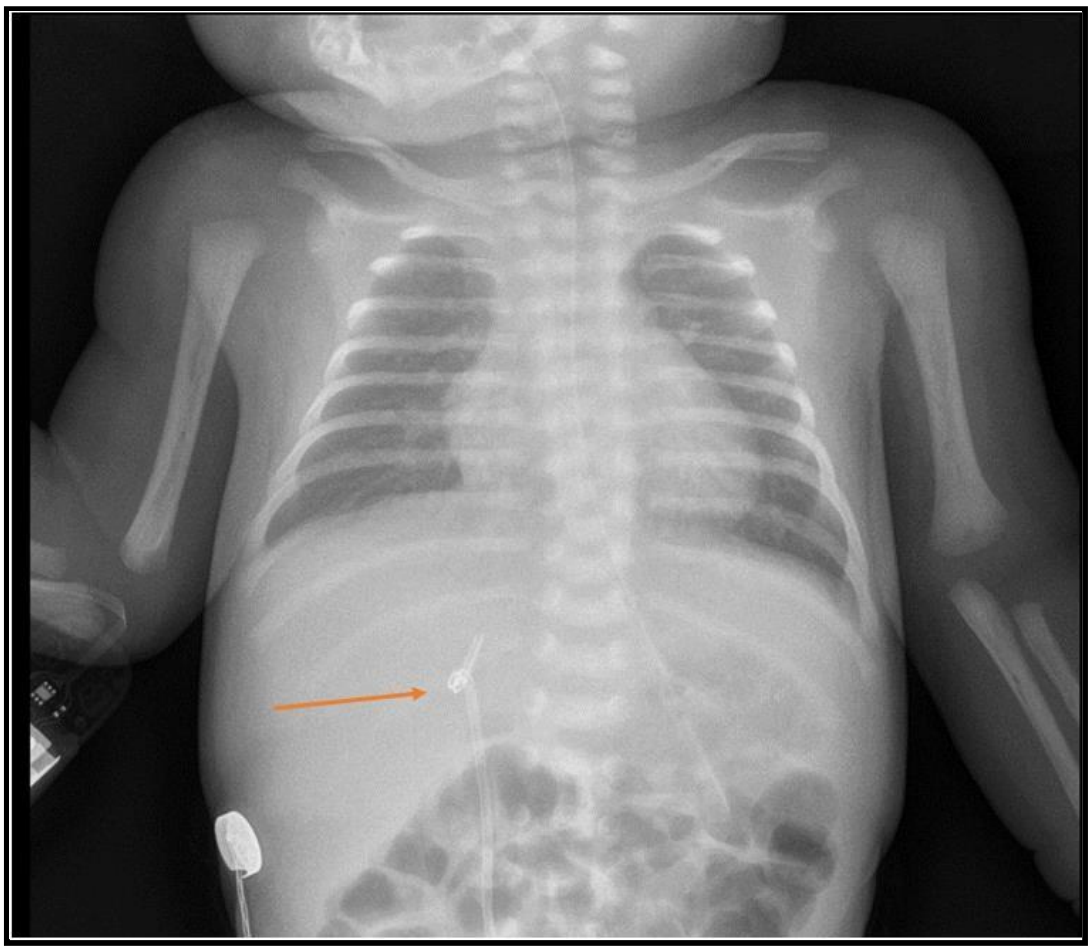

Figure 1b: Turning of the umbilical vein catheter in the vein when hematoma

In the entire abdominal ultrasonography (USG), a 60x50 mm-sized hematoma with lobulated contours showing multiple echogenic septations was observed in the liver **(Figure 2)**. Contrast-enhanced abdominal computed tomography (CT) performed on the patient revealed a 60x50x50 mm sized lesion that filled the liver parenchyma to a large extent, with air density in the anterior part, with smooth contours, opaque involvement, and dense content that was not related to the vascular structures in or in its immediate vicinity. In the examinations for its etiology, the Aspartate Aminotransferase test (AST) was 965, and Alanine aminotransferase (ALT) was 395 in liver function tests. Bleeding parameters were normal, micro C-reactive protein (CRP) was 120 mg/L (average: 0-5 mg/L), the alpha-fetoprotein level was 4385 ng/mL (575-22910 ng/mL), platelets were counted, and morphologically. Found normal. The patient's haemoglobin level, which was 17.5 mg/dL before the catheter, became 12.5 mg/dL when clinical findings developed. The patient regressed to 10.1 mg/dL on the same day and was given erythrocyte suspension support from 10 ml/kg. No low haemoglobin was detected in the follow-ups afterward. Periodic liver function tests and CRP values returned to normal on the postnatal 25th day. As a result of physical examination, imaging, and laboratory findings, the intrahepatic hematoma was thought to be due to catheterization, and the patient was followed up with intermittent abdominal USG. The patient's follow-up determined that the hematoma had significantly shrunk, and the surrounding area was calcified. The patient was discharged on the postnatal 30th day with recommendations to be followed up by the paediatric gastroenterology and radiology departments regarding liver hematoma.

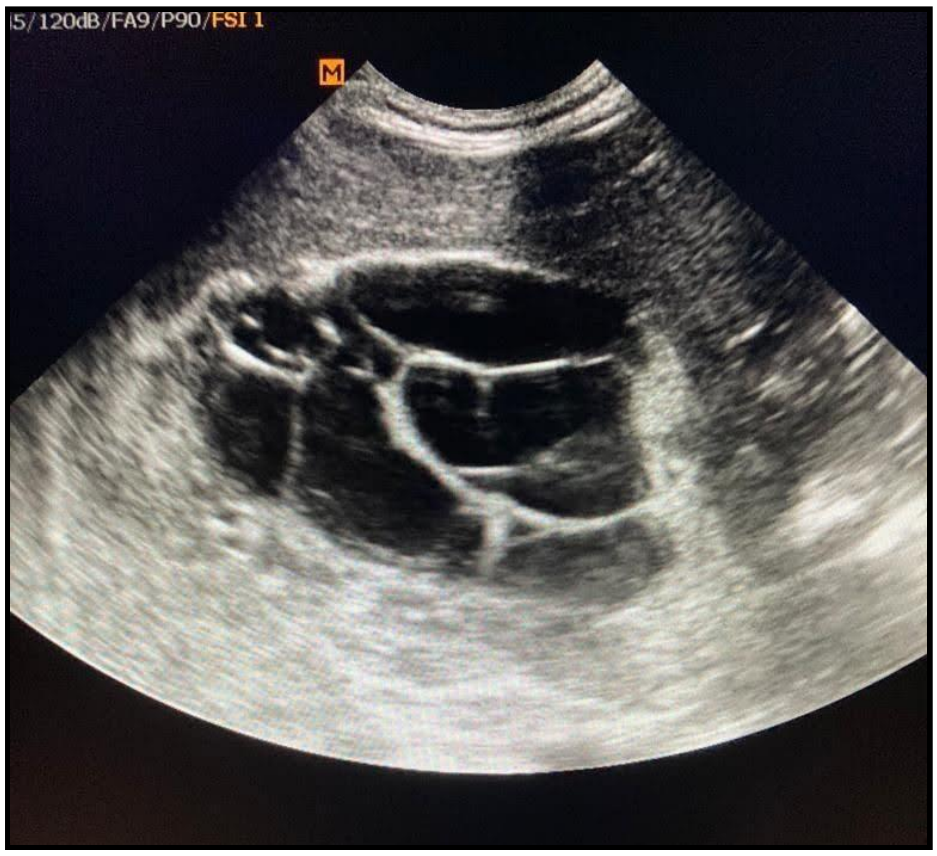

Figure 2: Image of hepatic septal hematoma on ultrasonography

Discussion

Umbilical vein catheterization (UVC) is a commonly used procedure in neonatal intensive care units during the care of critically ill patients, but UVC is not without complications. In the new-born circulation, the umbilical vein extends from the umbilicus to the liver. The ductus venosus is formed at the junction of the umbilical vein and the left portal vein, allowing blood to flow from the umbilical vein to the inferior vena cava (IVC) **[4]**. The ideal place where the umbilical vein catheter tip is placed is the junction of the inferior vena cava and the right atrium. This location is confirmed by visualization of the catheter tip at the 8th and 9th thoracic vertebrae level or just above the diaphragm on the chest X-ray. After the catheter is in place, blood should quickly come through the catheter and go through the catheter easily. If there is resistance during catheter insertion or if blood is complicated, incorrect placement of the catheter should be suspected **[5]**. As a result of incorrect placement of the catheter, perforation and tissue damage in various vessels and organs, thrombus formation, embolism, bleeding, vasospasm, catheter-related sepsis, arrhythmia, pleural and pericardial effusion are some of the complications encountered during and after umbilical vein catheterization **[1]**.

As the UVC is pushed too far, the catheter may pass from the IVC to the right atrium or end further in the superior vena cava (CVC). Cases of atrial flutter have been reported after advanced insertion **[6]**. If a patent foramen ovale (PFO) or atrial septal defect (ASD) is present, the catheter may travel in the left atrium or be pushed towards the pulmonary system and lung base, causing pleural cause. Perforation of the atrial wall leaving the tip in the pericardial cavity may cause pericardial effusions and cardiac tamponade **[7,8]**. Even if UVC is placed correctly, pericardial effusions and cardiac tamponade have been reported as catheter-related complications **[8]**. An intrahepatic misplaced UVC may cause sterile abscesses that can progress to infection or hepatic necrosis or complications such as hematoma in the liver, as in our case **[9]**. Babies whose UVCs are misplaced in the liver may show ascites due to extravasation or erosion, hepatomegaly, or may be found incidentally on imaging **[10,11]**.

The location of UVC in new-borns is not routinely visualized by abdominal ultrasonography. Ultrasonography (USG) is usually ordered when a new finding, such as ascites or weak flow from UVK, is seen and after the presence of a hematoma. On USG, the intraparenchymal liver lesion is usually found in echogenic and hypoechoic appearance, as in our case. In the literature, as in our patients, liver hematomas should be treated by removing UVC and allowing natural resolution resulting in complete calcification and healing of the hematoma, usually within 2-18 months **[10]**. If there are infectious signs or if the mass does not resolve with the removal of UVC, an infectious process, including liver abscess, should be considered.

The efficacy of this method was demonstrated in our case, as there was a gradual and continuous decrease in the size of the hematoma in the follow-up USGs of our patient. Although most hepatic hematomas resolve over time, the possibility of dangerous complications such as rupture, bleeding, or infection necessitates locating liver hematomas promptly and following up until resolution **[3]**. More research on the incidence of liver hematomas associated with UVCs is needed to understand better the frequency at which these complications occur. Improved diagnostic methods can be discussed to ensure the correct placement of UVC to prevent liver hematomas and many other complications of UVCs. UVC location is mainly confirmed by plain abdominal X-ray. Once the location of the catheter has been confirmed, there are no standards for subsequent follow-up of insertion, and often essential abdominal X-ray imaging is only

additionally performed if there is a new indication. Therefore, exploring alternative ways of detecting and tracking UVC's position throughout its permanent course would be appropriate. One imaging modality that may be useful is ultrasonography. This may allow the UVC position to be displayed more frequently while it is permanent and reduce its misplacement. A study found that 56 % of UVCs placed using plain abdominal radiography needed to be revised due to an inadequate position, and the use of USG led to a more precise initial placement **[12]**. Ultrasonography will also reduce the unnecessary radiation the newborn will be exposed to. In another study, they found that both X-ray and USG were reliable in determining the location of UVC, but USG was superior to X-ray in determining the tip position of the catheter **[13]**.

Conclusion and Recommendation

As a result, although it is seen that catheter-related complications that are not very common but have high mortality and morbidity can achieve positive results with early diagnosis and appropriatetreatment approach, we wanted to emphasize the need to apply umbilical catheterization procedures, which are frequently performed in neonatal intensive care units, to pay attention to the suitability of the catheter location, to determine the accuracy of the site by ultrasonography if necessary, more carefully.

Conflict of interest: There is no financial interest or any conflict of interest between the authors.

Statement of Ethics: Written informed consent was obtained from the patient to publish this case report and any accompanying images.

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