Right-sided hydrothorax: a complication of umbilical venous catheterization

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ABSTRACT

Umbilical venous catheters (UVC) are still used occasionally for fluid infusion in newborn infants. Although many complications have been reported, hydrothorax rarely occurs. We report a premature infant who developed right-sided hydrothorax due to fluid infusion through a malpositioned UVC.

Keywords: Umbilical venous catheter, complication, hydrothorax, newborn infant.

Case report

A 1300 gram premature male infant (triplet A) was delivered by cesarean section at 29 weeks' gestation. The baby was intubated in the delivery room and was supported by mechanical ventilation because of respiratory distress syndrome. Umbilical arterial and venous catheters (Argyle, Sherwood Medical 3.5 Fr gauge and 5.0 Fr gauge respectively) were inserted during the first hour of life. A radiograph of the chest and abdomen was obtained to determine the position of the catheters. The arterial catheter was located at the level of the fifth thoracic vertebra (T5). Therefore, it was pulled back by 1.5 cm to be at the level of the eighth thoracic vertebra (T8). The venous catheter had crossed from the right atrium to the left atrium, then to the left ventricle where it coiled and returned back to the left atrium and finally passed to the right lung through one of the pulmonary veins (Fig. 1). The venous catheter was pulled back by 8 cm. Chest x-ray was not repeated to determine the new position of the umbilical venous catheterization UVC. The arterial catheter was used for blood sampling, while the venous catheter was used for fluid infusion of Dextrose 10%. The infant received one dose of synthetic surfactant (Exosurf Neonatal; The Wellcome Foundation Ltd, London, England). Within the first 24 hours of life, he was weaned gradually from the ventilator and maintained on low ventilatory settings. On the second day, the infant developed respiratory distress and required higher ventilatory support. A chest radiograph was obtained at that time which showed a right sided pleural effusion, while the tip of the UVC was located in the right lung (Fig. 2). The UVC was immediately pulled out. A total 12 ml of yellow bloody fluid was tapped from the pleural cavity. The fluid analysis showed a glucose level of 19.0 mmol/L (342 mg/dl); protein <5 g/L; triglyceride <0.11 mmol/L; RBC 7500 x 10^6/L, WBC 44 x 10^9/L, (mainly monocytes and lymphocytes). No organisms were seen in the gram stain and subsequently the culture of the fluid was sterile. The infant did well after the pleural tap and was extubated to room air on the 3rd day of life. Follow-up chest radiograph showed complete disappearance of pleural fluid (Fig. 3).

Discussion

Umbilical vein catheterization was first introduced by Diamond et al in 1951.1 Ever since it has been used as a quick venous access during (a) resuscitation of the newborn (b) for exchange transfusion and occasionally to (c) infuse total parenteral nutrition. There are many reports documenting complications of malpositioned UVCs including hepatic necrosis8 pericardial effusion,2 perforation of the peritoneum, intra-abdominal hemorrhage and ascites.3 There are many reports of hydrothorax complicating fluid infusion through central lines4 but to our knowledge, hydrothorax, as a

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complication of malpositioned UVC was reported only once.1 Our patient developed a right-sided hydrothorax within the first 24 hours of starting the infusion of fluid through the UVC. One might argue that the effusion was congenital in origin. Against this is the fact that the initial chest x-ray showed no effusion (Fig. 1). Furthermore, the chemical analysis of the pleural fluid was compatible with that of the infused fluid, i.e., high concentration of glucose and low concentration of triglyceride and protein. This ruled out other causes of pleural effusion such as chylothorax and infection. Moreover, the effusion did not recur after removal of the catheter and the aspiration of the pleural fluid. In this case, hydrothorax occurred possibly through a perforation of the pulmonary vein and the fluid continued to be infused directly into the pleural cavity.2 Hence, we recommend that the length of the catheter should be measured before insertion, into the umbilical vein and if the catheter is manipulated, a repeat x-ray is essential to determine the new position of the tip catheter before commencing the infusion.

References