

Bilateral Pleural Effusion Complicating Umbilical Venous Catheterization

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Background: Umbilical venous lines are sometimes complicated with pleural and or pericardial effusion, often due to line migration. **Case Characteristics:** Bilateral chylous pleural effusion without pericardial effusion in a 28 weeks, extremely low birth infant who was on total parenteral nutrition. **Observations/Investigations:** Investigations including chest x ray and 2D echocardiogram showed bilateral chylous pleural effusions but appropriate tip position of the umbilical venous line. **Outcome:** Removal of the umbilical venous line and cessation of total parenteral nutrition resulted in complete resolution of the pleural effusion. **Message:** In any newborn with central venous catheter in situ, acute deteriorations specially, those related to pleural and pericardial effusions should alert the clinicians to remove the catheter and should not be misguided by apparently appearing normal correct catheter position by x-ray or 2D echocardiogram.

Keywords: *Complication, Central line, Parenteral nutrition, Pleural effusions, Umbilical vein.*

A preterm extremely low birth weight (ELBW) infant developed recurrent apneas and bilateral pleural effusions secondary to umbilical venous catheterization. The infant was managed by prompt drainage of the pleural fluid, supportive care and removal of the umbilical catheter. Although pericardial effusion and unilateral pleural effusion as complication of umbilical venous lines were previously reported [1-4], bilateral pleural effusion without pericardial effusion is not reported in newborns.

CASE REPORT

A preterm ELBW infant was born to a Gravida 3 mother at 28 weeks of gestation by emergency lower cesarean section secondary to doppler compromise and antepartum hemorrhage. Apgars at 1 and 5 minutes were 8 and 9, respectively. Antenatal period was complicated with maternal hypothyroidism and mother was diagnosed with autoimmune thyroiditis. The infant was admitted to NICU at 30 minutes of life and was started on nasal prong oxygen in view of mild respiratory distress. Chest radiograph at admission was normal. An umbilical venous line was inserted at 3 hours of life for partial parenteral nutrition. Position and tip of the line was confirmed with chest radiograph and 2D echocardiogram. On the second day of life, the infant was started on total parenteral nutrition with a protein of 3g/kg/day and lipid of 2gm/kg/day.

At 46 hours of life, the infant had an apnea, with cessation of breathing, cyanosis and bradycardia. Apnea was managed with continuous positive airway pressure and caffeine citrate. Blood sugar, calcium, electrolytes were normal. Screen for intracranial hemorrhage was negative. Chest radiograph showed haziness of the right lung field. Blood cultures were sterile. Over the next few hours, the newborn showed worsening capillary perfusion, recurrent apneas and off color. It was intubated and started on mechanical ventilation. Ultrasound chest at 50 hours of life showed bilateral pleural effusion with fluid collection more on the left side and there was no pericardial effusion. Twenty ml of milky white chylous fluid was drained from the pleural cavities. Pleural fluid evaluation revealed 500/mm³ cell count with neutrophilic predominance (78%), protein of 0.4 g/dL, lactate dehydrogenase of 73 units/liter, triglycerides of 453 mg/dl and 30,000/mm³ red blood cells. Infant screening for hypothyroidism showed high TSH (17.22 μIU/mL), low Free T3 (6.6 pg/mL) and low Free T4 (1.46 ng/dL). Repeat chest radiograph showed good lung expansion, resolution of haziness and umbilical line in appropriate position. Ultrasound abdomen also showed umbilical vein catheter in position. However, the line was removed at 52 hours of life, the infant was extubated at 78 hours of life and was supported with nasal prong oxygen. Thyroxine was started orally at 15 mcg/kg on day 4 of life. Trophic feeds were started on day 4 of life and parenteral nutrition was restarted on day 5 of life after establishing a

peripherally inserted percutaneous venous line in the lower limb. Full enteral feeds (150 mL/kg/day) with fortified human milk were achieved on day 13 of life. There was no recurrence of pleural effusion or respiratory distress. Infant regained birth weight on day 16 of life.

DISCUSSION

Chronology of events, drainage of chylous fluid from the pleural cavities, no recurrence of pleural collection after removal of umbilical venous line, high triglycerides in the pleural fluid support an association of umbilical vein catheter with bilateral pleural effusions in our index infant on parenteral nutrition. Two possible explanations for umbilical line induced pleural effusions are, line migration and hyperosmolar endothelial damage. Migration of catheter tip may occur because of movement of head and extremities and flushing of umbilical venous catheter by nursing staff. The umbilical vein catheter could perforate the pericardial sac to the mediastinum and cause bilateral pleural effusions. In the index case there was no evidence of catheter perforation of vessel wall or migration of catheter tip. Increased osmolality of the parenteral fluid causing endothelial damage may be the most plausible explanation for pleural effusions in this infant. Although, congenital hypothyroidism is rarely associated with chylothorax [5], the rapidity of improvement and the chronology of events make this association unlikely in the index case.

Sridhar, *et al.* [1] reported left pleural effusion in a 31 week preterm infant due to peripherally inserted central catheter migration 24 hours after insertion. They confirmed the line position with contrast X-ray which showed the tip in the left pulmonary artery and dye in the left lung field. The effusion resolved with removal of catheter. Pabalan, *et al.* [2] reported right sided pleural effusion in a 28 week preterm infant following umbilical venous catheterization. The complication occurred nearly 40 hours after the line placement. Chest X ray revealed normal tip position of the catheter. Drainage and catheter removal helped in complete resolution of the pleural effusion. Hong, *et al.* [3] reported umbilical venous line

related pleural and pericardial effusion in a 34 week preterm infant [3]. In their case, the newborn was started on parenteral nutrition on day 2 of life, developed pleural effusion 5 days and pericardial effusion 8 days after insertion of umbilical venous catheter. The symptoms cleared only after removal of catheter on day 13 of life. The catheter position and tip was always appropriate and there was no evidence of line migration. Madhavi, *et al.* [4] reported right pleural effusion in a 26 week extremely preterm infant secondary to migration of a central venous catheter into pulmonary vasculature. They confirmed the catheter tip in right pulmonary artery by radiographic contrast examination. The baby improved after aspiration of pleural fluid and removal of central venous catheter. Similar cases of pericardial and unilateral pleural effusions [6] related to umbilical venous catheter or peripherally inserted central catheter placements have been well reported. However, bilateral pleural effusions without pericardial fluid complicating umbilical line placements are rare and not reported previously in newborns.

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