

Pericardial Effusion in an Extreme Low Birth Weight Neonate with Peripherally Inserted Central Catheter

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ABSTRACT

Background: Pericardial effusion and cardiac tamponade are the rare complications of peripherally inserted central catheters (PICC insertion) in extreme low birth weight infants. In this regard, paying attention to these complications is of utmost importance, because they can result in infant death.

Case report: The case of our infant is a sample of these complications. On the 39th day of the birth of the infant, the muffled sounds of heart and pathological murmurs in heart auscultation raised the doubt of a problem in infant's heart.

Conclusion: In this regard, echocardiography was performed. The report was massive pericardial effusion impending tamponade. After pericardiocentesis for saving infant's life, diagnostic evaluations were performed, and PICC insertion was proved as the cause of these complications. Although these complications are usually diagnosed with symptoms like bradycardia, hypotension, and drop in saturation or cardiac arrest, the first step of diagnosis in our infant was abnormal heart examination. Therefore, it is essential that all neonatologists pay attention to heart examination of infants with PICC along with other symptoms such as bradycardia, hypotension, and drop in saturation or cardiac arrest to avoid occurring pericardial effusion and cardiac tamponade as rare complications of PICC insertion. They should consider pericardial effusion and cardiac tamponade as the fatal complications of PICC insertion in extremely low birth weight infants with PICC.

Keywords: Cardiac tamponade, Extremely low birth weight infant, Pericardial effusion, PICC insertion

Introduction

The peripherally inserted central catheter, as described in 1975 by Hoshal (1), has been identified as a way for intravenous fluid therapy. Over time, use of this method proved that despite numerous advantages, there are various complications including, damage to arteries and veins as vascular complications, cardiac arrhythmias, and cardiac arrest as cardiac complications and infections. As well as these recognized complications, rare complications with PICC have also been reported and one of them was tamponade(2-4).

Case report

A neonate boy was born at gestational age of 27 weeks and 5 days by NVD due to labor pain. His mother was 23 years old and the only

medical problem in her medical history was hypothyroidism that was under treatment and control. His father was 25 years old with no medical problems in his medical history. His parents were not blood relatives, and the neonate was their first child. The baby weighed 780 g. His Apgar was 3, 6 and 7 at 1, 5 and 10 minute, respectively. At birth he was cyanotic and hypotonic with no breath and crying and he only cried and breathed after resuscitation measures. However, due to cyanosis, falling of oxygen saturation and respiratory distress, the baby was ventilated on continuous positive airway pressure (CPAP). Thereafter, he was transferred to neonatal intensive care unit (NICU). His only abnormal examinations when entering NICU were subcostal retraction in inspection and grunting in auscultation

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According to this condition, he was diagnosed with sepsis and respiratory distress syndrome. Therefore, chest x-ray and blood samples for laboratory measures were taken, Ampicillin, Gentamycin were started and surfactant was instilled to his airway. Early-onset sepsis was raised as the cause, based on the results of CBC with differential and due to leukopenia and neutropenia in the 3rd day (WBC=3900, neutrophils=12% lymphocyte=76%). Therefore, sepsis workup continued with the lumbar puncture and urine culture. The findings of the tests were negative in blood culture, CSF culture, and urine culture. In addition, on the 9th day of birth, hematocrit and platelet, packed cell and GCSF were injected to the baby, due to his low hemoglobin. In addition, treatment with levothyroxine began on the 10th day of birth with the diagnosis of congenital hypothyroidism.

One point about his ventilation method that should be mentioned is that he was ventilated with CPAP in the first week of birth, in the second week humidified high flow nasal cannula was his ventilation method, and from the 16th day to 21st-day low flow oxygen was the ventilation method. In this regard, on the 21st day of birth, the fall in oxygen saturation and the need for more oxygen changed the ventilation method to CPAP. The following day, cardiopulmonary arrest following by cardiopulmonary resuscitation led to synchronized intermittent mechanical ventilation mood for two days. This condition raised the late-onset sepsis as the cause; thereafter, time laboratory measures, chest x-ray, CSF cultures,

urine culture and blood cultures were done to investigate the causes. Regarding this, chest x-ray was normal, in laboratory measures WBC was 14700 with 56% neutrophils and 34 % lymphocyte, CSF culture and urine culture were negative, while blood culture showed enterococcus growth. Therefore, considering the enterococcus growth in blood culture samples of 22nd day of life, late-onset sepsis was confirmed. Thereafter, treatment with Linezolid started, and continued after the confirmation of enterococcus susceptibility to Linezolid in antibiogram test.

On the 25th day of birth the PICC was inserted electively through the left basilic vein for the baby, due to parenteral feeding and injection antibiotic therapy need in this time. Appropriate place of catheter was confirmed with chest x-ray (Figure1).

On the 39th day of the birth according to the muffled sounds and pathological murmurs in the heart ,auscultation echocardiography was performed. The report was massive pericardial effusion impending tamponade (figure 2) ; therefore, pericardiocentesis was done to avoid the occurrence of tamponade and 5cc fluid was drained and echocardiography performed again (Figure 3). The fluid was sent for analysis and culture (RBC=5000, WBC=0 Protein=2300 Glucose=282 culture=negative), thyroid function tests were sent again (TSH=0/7, free T4=29), and PICC was removed, while he was treated with Linezolid. Echocardiography showed elimination of pericardial effusion after thoracocentesis. Therefore, the baby was separated from CPAP and

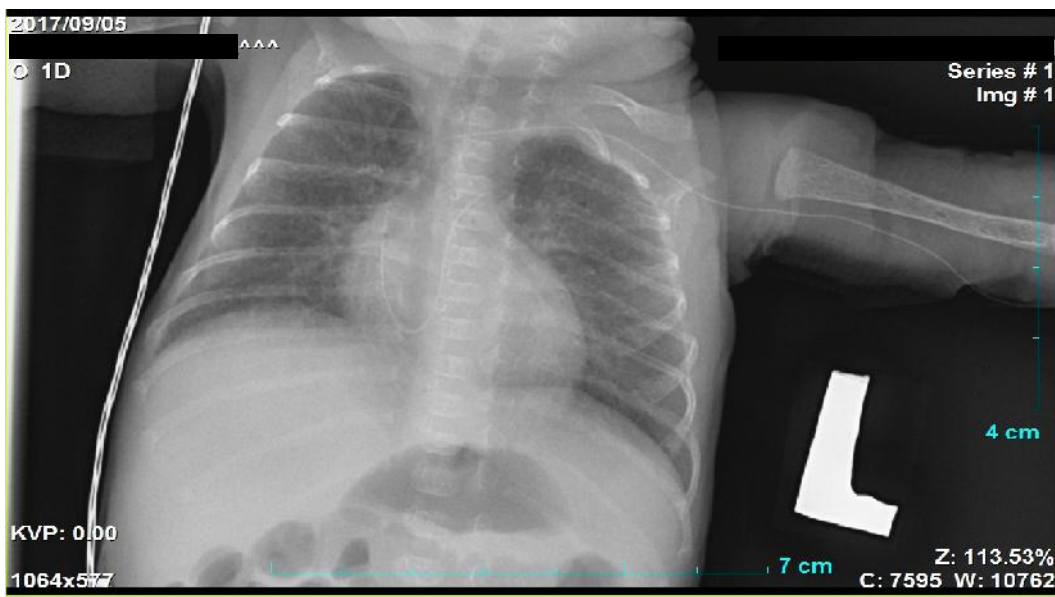


Figure 1. Appropriate placement of catheter on the 25th day of birth



Figure 2. Echocardiography before pericardiocentesis (massive pericardial effusion)

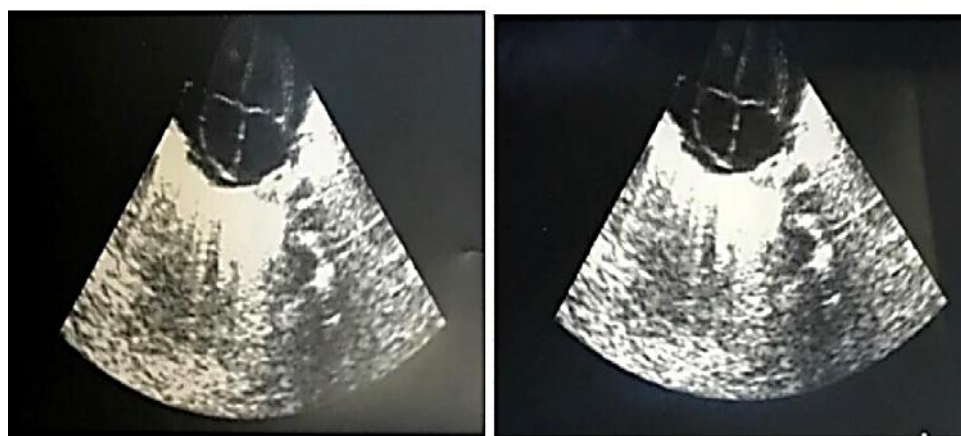


Figure 3. Echocardiography after pericardiocentesis

ventilated with humidified high flow nasal cannula after two days. The following day, ventilation method was changed to oxygen hood which was well tolerated by the baby.

Discussion

PICCs are increasingly used in premature infants to provide parenteral nutrition and injection of antibiotics and fluids. Several studies reported complications due to PICCs, such as sepsis, thrombosis, and vascular injuries. Furthermore, pericardial effusion and tamponade were mentioned as the rare complications (2-7).

The hypothesis of tamponade and pericardial effusion should be considered for any newborn with PICC insertion presenting bradycardia, hypotension, and drop in saturation or cardiac arrest, particularly if not preceded by respiratory failure (8-13). The echocardiogram confirmed the diagnosis and pericardiocentesis was accepted as the emergent treatment. High mortality rate (i.e.,75%) was reported in the absence of

pericardiocentesis performance (13). The suspicion of pericardial effusion in our patient raised when the muffled sound of heart and pathologic murmurs were heard in physical examination. Emergency echocardiography was requested because babies with such events often pretend to cardiopulmonary arrest(14). Echocardiography confirmed the pericardial effusion (Figure2). Enterococcus sepsis, linezolid, and child's hypothyroidism were considered as the probable causes of pericardial effusion beside these factors, while PICC insertion was considered a rare side effect. Therefore, a request for pericardial fluid culture, thyroid function tests, and the removal of the device was ordered. Dramatic clinical response was observed after the removal of the device along with negative results of experiments, pericardial fluid culture and normal thyroid tests. In addition, no adverse effects of pericardial effusion were reported in Linezolid(15).

It is worth mentioning here that although in previous reports pericardial effusion occurred

from 3 hours to 6 days after PICC insertion, in our case this event occurred on the 14th day of catheterization (9-13).

Conclusion

Although pericardial effusion is a rare complication of PICC, neonatologists should consider PICC insertion as a cause of pericardial effusion. It may be possible even if the site of the catheter was confirmed by chest x-ray. The development of this complication can result in infants' death. Consequently, it is imperative that all neonatologists carefully monitor the infant's heart examination.

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