

A cardiac tamponade caused by catheter-related sepsis in a preterm infant

Preterm infantta katater ilişkili sepsisin neden olduğu kardiyak tamponad

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Abstract

Cardiac tamponade due to catheter related sepsis in premature neonate is a rare and life-threatening complication; but prompt diagnosis and intervention can reverse this situation. We report a nine-day-old preterm infant who presented with pericardial effusion and cardiac tamponade secondary to catheter related sepsis. This report highlights two important aspects: occurrence of pericardial effusion in a neonate with peripherally inserted central venous catheter (PICC), with no evidence of composition of hyperosmolar parenteral solution, and awareness of sepsis as a cause for this critical condition.

Keywords: Cardiac tamponade, catheter, newborn, pericardial effusion, sepsis.

Öz

Prematüre yenidoğanda kateter ilişkili sepsise bağlı kardiyak tamponad nadir görülen ve hayatı tehdit eden bir komplikasyondur. Ancak hızlı teşhis ve müdahale bu durumu tersine çevirebilir. Biz, kateterle ilişkili sepsise sekonder perikardiyal efüzyon ve kardiyak tamponad ile karşımıza çıkan dokuz günlük preterm bir bebek sunduk. Bu raporda iki önemli konu vurgulanmaktadır: periferal yerleşimli santral venöz kateteri (PICC) olan bir yenidoğanda, hiperosmolar parenteral solüsyonun bileşimi ile ilgili kanıt bulunmamasına rağmen, perikardiyal efüzyonun ortaya çıkabileceği ve sepsisin bu kritik durum için bir neden olabileceğidir.

Anahtar Sözcükler: Kardiyak tamponad, katater, yenidoğan, perikardiyal efüzyon, sepsis

Introduction

Pericardial effusion and cardiac tamponade can be seen with unspecific signs. If immediate intervention is not performed, these may result in death (1). This complication should be considered in any neonate who deteriorates suddenly, responds to resuscitation late and has heart beats being heard deeply. It can be confirmed by echocardiography. Prompt

pericardiocentesis should be done as soon as possible (2). We present a preterm infant with pericardial effusion and cardiac tamponade related to sepsis. We would like to draw attention on cardiac tamponade as a reason of sudden deterioration of preterm neonates. In addition, we want to consider that cardiac tamponade might be a complication of sepsis.

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Case Report

A 28-week gestation female, with a birth weight of 1070 grams, was born 34-year-old preeclamptic mother via cesarean section. She was hospitalized due to prematurity and respiratory distress. Her prenatal history was unremarkable. Her parents were consanguineous, and her ten-year-old and five-year old sisters were healthy. She was on nasal continuous positive airway pressure (CPAP) ventilation with a FiO_2 of 0.3 and a PEEP of 5 cmH_2O due to slight tachypnea on the physical examination. Ampicillin and aminoglycoside were begun due to the possibility of congenital pneumonia. Total parenteral nutrition and minimal enteral nutrition were started. Then a 28 gauge peripherally central venous catheter (PICC) (1 Fr, Premicath, Vygon, Germany) was inserted through the left basilic vein on day two. After insertion, position of catheter was confirmed by chest x-ray and the catheter tip located at the junction of superior vena cava and right atrium. Because of resolution of tachypnea and negative result of C-reactive protein and blood culture, antibiotics were stopped. On the ninth day of postnatal age, sudden desaturation and cardiac arrest occurred. Cardiovascular resuscitation was started immediately, and the patient was intubated. After four minutes, she responded to cardiopulmonary resuscitation, beats of heart per minute became higher than 100 and oxygen saturation was 97%. Catheter was displaced, cultures of blood, urine and catheter tip were taken. Vancomycin and meropenem were started due to possibility of suspected sepsis after samples taken for laboratory investigation. Elevation of C-reactive protein and hyperglycemia were detected, other hematological and biochemical parameters were found to be normal. Additionally, heart sounds were heard deeply, so echocardiography was applied immediately by pediatric cardiologist and it showed the compression of left atrium due to large pericardial effusion (PCE) with cardiac tamponade (Figure-1). Besides, there had been no evidence in the previous echocardiographic examination performed six days ago. Subxiphoid pericardiocentesis was performed and 16 ml translucent fluid was drained. Appearance and biochemical analysis of the obtained pericardial fluid showed no consistency with the composition of the total parenteral nutrition (TPN). Also, no evidence of catheter injury was detected during the operation. Methicillin resistant coagulase negative

staphylococcus (MRCNS) was identified in both blood culture and culture of catheter tip. The patient was extubated on the first postoperative day, follow-up echocardiograms showed no re-accumulation and she was followed up due to her prematurity and discharged from hospital on 51th postnatal day.



Figure-1. Pericardial effusion.

Discussion

Pericardial effusion (PCE), an abnormal fluid collection within the pericardial space, is uncommon but life-threatening condition in the neonatal period. In the intensive care setting, predisposing factors for PCE are hydrops, complication of central venous catheters or cardiac operations, sepsis, thyroid hormone dysfunction and tumors (3). It can be complicated with cardiac tamponade and presented as sudden cardiac collapse or unexplained cardiorespiratory instability (bradycardia, cyanosis and metabolic acidosis) that can be confused with the symptoms of sepsis (4, 5). It is diagnosed with echocardiography if considered. Immediate drainage of the effusion is the mainstay of the treatment of cardiac tamponade (4). Peripherally inserted central venous catheter (PICC) is a suitable intravenous route for administration of antibiotics and TPN in premature neonates. However, occlusion, leakage, phlebitis, catheter related sepsis can be seen as complications of PICCs (4, 6). Catheter related sepsis is defined as clinical deterioration and a positive blood culture with the same microorganism present on the catheter tip and clinical and microbiological absence of any other source of

infection (6). Rate of PICC related sepsis ranged from 0% to 29% of placed catheters, resulting in 0.3 to 16.7 per 1,000 catheter days (7). Also, twenty-eight cases of pericardial effusion or cardiac tamponade were reported by Ohki et al., representing an estimated frequency of 0.07-0.11% of PICC insertions (8). To reduce the risk of catheter related complications, the catheter should be inserted into an appropriate vein in the absence of any clinical sign of infection and the position of the catheters should be confirmed radiographically. Then, the catheters should be secured with sterile adhesive strips and covered with sterile transparent adhesive dressing. Both the sterile adhesive strips and the transparent dressing must change periodically or when necessary (6).

In our case, a sudden unexplained cardiac arrest occurred, and she responded hard to resuscitation. Even though catheter seemed like the precipitating factor, biochemical analysis of the obtained fluid was not consistent with the composition of the hyperosmolar TPN solution. To clarify etiology, other reason of translucent pericardial effusion was investigated. Thyroid hormones, her first echocardiography and abdominal ultrasound examinations were normal. After the fluid aspiration, her status was suddenly ameliorated,

and this deterioration was not seen again. Although we pay attention to aseptic conditions, MRCNS isolation from both blood and catheter tip cultures were related with PICC. In despite of a lot of case reports related to cardiac tamponade associated with catheter perforation and PCE, including TPN fluid composition, Lawrenz-Wolf et al. reported a case with cardiac tamponade from bacterial pericarditis following catheter related sepsis in a neonate similar with our case (4, 9). Similarly, Durao et al. presented two case reports of cardiac tamponade in adult patients, secondary to methicillin resistant staphylococcus aureus pericarditis (10).

In conclusion, cardiac tamponade is rare but emergent clinical situation in neonates. Immediate bedside echocardiography and pericardiocentesis can be lifesaving. Even though perforation associated with catheter is considered primarily as a cause of PCE and cardiac tamponade, other reasons such as sepsis should be kept in mind especially for a case of sudden deterioration of neonates.

Disclosure: Informed consent was obtained from the patient's family.

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