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CASE REPORT

Case Report: Pericardial effusion with "Swimming Heart" after umbilical venous catheterization

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Abstract

Umbilical vein catheterization (UVC) in newborns (NB) is frequently used as a vascular access. Due to its invasive characteristics, complications may occur, such as cardiac tamponade. The aim of this article is to report a case of pericardial effusion with "swimming heart" resulting from a newborn UVC and to propose preventive approaches to avoid UVC-related complications.

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INTRODUCTION

Umbilical venous catheterization (UVC) is widely used in neonatology units[1], as it is the most accessible intravenous route for administering medication to newborns in the first days of life. It can be performed quickly and safely[2]. The procedure can be indicated for exchange transfusions, monitoring of central venous pressure and administration of fluids, drugs and parenteral nutrition[2-4]. Because it is an invasive procedure, CUV can trigger serious complications, including cardiac tamponade.

Cardiac tamponade as a complication of UVC in newborns is rare, but serious[1] and has high mortality[5]. The rapid cardiovascular or respiratory deterioration of the NB with CUV may indicate the presence of tamponade[6]. The echocardiogram confirms the diagnosis and assists in performing emergency pericardiocentesis, the only effective measure to avoid death[5]. Diagnosis and treatment must be done quickly in order to reduce the risk of mortality.

CASE REPORT

Female NB, GA: 31 weeks, mother with regular prenatal care, age 40 years, G3 P2 A0, presence of untreated gestational diabetes, normal serology and gestational ultrasound. Evolved with normal delivery due to preterm labor, Apgar 6/7, birth weight: 1740g, neonatal resuscitation with positive pressure ventilation and tracheal intubation. Umbilical venous catheterization was performed after birth. She was diagnosed with respiratory distress syndrome requiring a dose of surfactant on the first day of life. Elective extubation on the second day of life, placed on CPAP with good tolerance.

On the eighth day of life, the patient evolved with worsening of respiratory distress with tachypnea and tachycardia, remaining hemodynamically stable with CPAP tolerance despite clinical worsening. A chest X-ray was performed, which showed no alterations in the lungs, CUV on T11 and an increased cardiac area in relation to the previous examination. Transthoracic echocardiogram with evidence of major pericardial effusion, anterior and posterior, with cardiac tamponade, suggestive of " Swimming Heart". Performed by cardiac surgery, ultrasound-guided pericardial drainage, with output of 15 ml of milky fluid suggestive of parenteral nutrition. Evolved after the procedure with hypotension with rapid improvement after volume expansion. Umbilical catheter removed. Suspended CPAP 24 hours after procedure.

The patient had a good clinical evolution after the procedure and was kept on room air. No new complications during hospitalization. Hospital discharge at 28 days of life.

DISCUSSION

As more and more extremely premature and very low birth weight babies are resuscitated in the delivery room and survive, umbilical venous catheterization is being used more frequently in neonatal intensive care[7]. The procedure must be done carefully, strictly following the catheter insertion technique. The definition of the length of the catheter to be inserted is essential for proper positioning of the catheter tip. However, a variety of length calculations exist and can be based on the patient's length or weight and shoulder-navel distance. These equations remain inexact[8]. Ideally, the tip of the umbilical catheter should be located at the junction of the inferior vena cava with the right atrium[1,3,9-11] or in the thoracic portion of the inferior vena cava above the diaphragm[9,11].

The position of the catheter tip must be identified with chest and abdominal radiography[3,4]. Radiologically, the catheter tip must remain outside the cardiac silhouette, but still within the vena cava (approximately 1 cm outside the cardiac silhouette in preterm infants and 2 cm in full-term infants)[6]. The infusion of hypertonic solutions is only approved for use after identification of the catheter tip. The radiograph should be routinely repeated in order to identify a displacement of the catheter tip[6,9,11], as the catheter can move even after it is correctly positioned. If the tip is inside the atrium, it must be removed immediately[11].

Although simple chest radiography performed in bed is the most used method to certify the location of the umbilical catheter worldwide, several studies have demonstrated an incorrect positioning in patients who had an ideal location in the first radiological examination[1]. It was observed that, when performing echocardiography, especially in premature infants, a significant number of catheters were located inside the left or right side of the atrium, despite appearing to be in the ideal position in the radiographic analysis[9]. Routine use of bedside ultrasound would be the most appropriate procedure, as it has advantages over chest radiography, since it does not use ionizing radiation, has greater equipment portability, obtains an image in real time, and can be performed by the patient himself. doctor at the bedside, eliminating the need for a technician to operate the equipment[9,12].

Correct positioning of the catheter can be difficult, especially for inexperienced medical staff, and success rates only improve as experience is gained[10]. The correct placement rate does not reach 25% and this percentage does not tend to improve with specific training of the team to perform the CUV[10].

Most complications of UVC are related to poor positioning or displacement of the catheter, with prematurity being an additional risk factor[13]. One of the main complications is pericardial effusion[1,3,4,9].

In neonates, the risk of cardiac tamponade associated with the use of CUV is 3%[16]. Beardsall et al. (2003)[15] analyzed about 46,000 central lines and found pericardial effusion and/or cardiac tamponade in 1.8/1000 installed venous lines and death from this complication in 0.7/1000, and in 24% of cases cases the diagnosis only occurred after the death of the newborn. The mortality of cardiac tamponade associated with

CUV has been estimated at 45% to 67%, which is secondary to the lack of warning signs with sudden decompensation[6]. The high mortality is associated with delayed diagnosis, being 75% when pericardiocentesis is not performed[5].

Cardiac tamponade due to CUV is a complication that every neonatologist must be able to diagnose quickly, due to its high mortality in the absence of treatment. The hypothesis of tamponade should be considered for any newborn with CUV who presents with sudden clinical deterioration, presenting with non-specific signs, such as bradycardia, hypotension, cyanosis, dyspnea, drop in saturation or cardiorespiratory arrest, whether or not requiring CPAP, intubation and CPR[1,5].

Cardiac tamponade occurs when there is an abnormal accumulation of fluid in the pericardial cavity, with a volume large enough to prevent the heart from filling in diastole (in children > 1 ml/kg)[14]. Packing usually occurs on the third or fourth day after the CUV perforates the atrium[7]. The pathophysiology of pericardial effusion in newborns with central venous access is uncertain[1,6]. This can occur by direct injury to the catheter tip at the time of its installation, by migration of the catheter, by wall necrosis caused by the infusion of a hyperosmolar solution , by a local inflammatory mechanism leading to transudation into the pericardial space or by adherence of the tip of the catheter. catheter to the myocardium, with formation and displacement of the thrombus[1,5,6,15].

Ideally, the presence of pericardial effusion should be confirmed with echocardiography and, if there are signs of cavity filling restriction, pericardiocentesis should be performed immediately[1]. Radiography may not show the increase in cardiac silhouette, so the echocardiogram confirms the diagnosis and helps in emergency pericardiocentesis, the only effective measure to avoid death[5]. Pericardiocentesis has been associated with a significant reduction in mortality[6], however most Brazilian hospitals do not have a pediatric cardiac surgery team or thoracic surgery team with operative training in children, making the treatment of pericardial tamponade in newborns a challenge for the team. assistant physician[12]. Although the pediatric surgery team is undoubtedly qualified to perform the procedure, it is not part of their routine to address complications related to pericardiocentesis, such as the need for thoracotomy, pericardiotomy and cardiac suture[12].

CONCLUSION

The correct positioning of the umbilical venous catheter must always be confirmed in order to increase the safety of the procedure and reduce complications with increased morbidity and mortality.

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