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Cardiac tamponade associated with umbilical venous catheter (UVC) placed in inappropriate position

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Abstract

Umbilical venous catheter (UVC) is widely used in neonatal intensive care units. Pericardial effusion is an uncommon but life-threatening complication; and tamponade have been reported in 3% of neonates having such catheters. We present a case of cardiac tamponade as a complication of venous catheter in a neonate. The patient was diagnosed at the appropriate time by echocardiography and the pericardiocentesis was performed, and after removal of the complete pericardial effusion, an improvement of the critical condition was achieved. It is important to document the optimal positioning of UVC before the start of infusions. (Gac Med Mex. 2015;151:369-71)

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KEY WORDS: *Cardiac tamponade. Umbilical venous catheter. Pericardial effusion. Pericardiocentesis. Newborn.*

Introduction

Central venous catheterization is widely used in neonatal intensive care units and, although it is considered a relatively safe procedure, in some rare occasions it can produce fatal consequences, such as cardiac tamponade[1].

Pericardiac effusion is defined as higher-than-normal presence of fluid in the pericardiac space (in children > 1 ml/kg)[2].

In neonates, the risk of pericardiac effussion associated with the use of central venous catheter (CVC) is estimated to be 3%[3], although some authors have defined this complication in even lower figures with the placement of percutaneous catheters, with a rate of 1.8 per each 1,000 placed catheters[4].

This event should be considered in any neonate presenting with acute deterioration and recent placement of a CVC with high degree of suspicion, since it represents an emergency situation and can result in a fatal outcome[5]. However, this in not the only complication, since arrhytmias, intra-cardiac thrombosis, systemic and pulmonary emboli, endocarditis, myocardial perforation, pleural effusion, ascites, hemorrhage and infection associated with the use of catheter can also occur[6-9].

The purpose of this work is to report the case of a neonate who overcame an important pericardiac effusion with secondary tissue hypoperfusion, by means of succesful pericardiocentesis with extraction of total excessive fluid.

Clinical case

This is the case of a male patient who was born as a result of his mother's third, apparently healthy, pregnancy at 35 weeks of gestation due to premature rupture of

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Figure 1. *Initial chest x-ray film.*

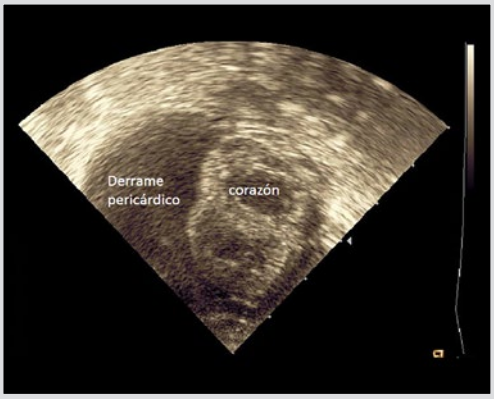

Figure 2. *Ventricular echocardiogram short axis view.*

membranes and transvaginal bleeding with 8-h evolution. The infant was born by Cesarean section in another unit. Data of placental detachment, positive-pressure bag-mask ventilation requirement, APGAR 4/7/8, Silverman Anderson 3 and 2,180 g of weight were reported. Initially, the patient required the use of an oxygen hood. Then, an umbilical venous catheter (UVC) was placed; the patient evolved with more respiratory distress and the decision was made to endotracheally intubate for ventilatory mechanical support. The patient was admitted to this hospital at 2 days of life, with 97% saturation, and data consistent with hypoperfusion and characterized by tachycardia, cutis marmorata, delayed capillary refill, cold skin, diminished pulses, hypoactivity, low reactivity to stimuli and decreased urination. His tensional figures were still preserved, with normal cardiac sounds and liver 2 cm below the right costal margin. Chest x-ray revealed cardiomegaly with a cardio-thoracic ratio of 0.70, migrated catheter tip, passing through the foramen ovale and with the tip in the left atrium close by the junction with the left pulmonary artery (Fig. 1).

In the echocardiogram, significant pericardiac effusion, right atrium diastolic collapse, mitral E/A wave inversion and preserved systolic function were identified (Figures 2 and 3).

Trans-thoracic echocardiogram-guided percutaneous pericardiocentesis was performed under sedation, local analgesia and continuous non-invasive monitoring, using the peripheral puncture needle of the Multicath 3fr kit; 40 ml of yellow-greenish fluid were obtained. The procedure was concluded when total drainage was echographically visualized (Fig. 4).

The report on the pericardiac fluid was: yellow color, 253 red blood cells per field, 47 leukocytes, glucose 483 mg/dl and VDRL, India ink and gram staining were negative. The venous catheter was repositioned; progressive reduction of aminergic support was achieved until discontinuation. A new chest x-ray showed no cardiomegaly (Fig. 5). Pericardiac fluid culture report revealed no bacterial development. The patient was discharged after 10 days of stay in general good conditions, with no new pericardiac effusion development.

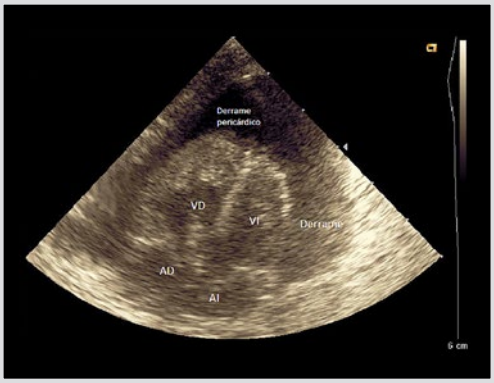

Figure 3. *Four-chambers axis view echocardiogram.*

Discussion

Although, currently, CVC is widely used, especially in intensive care units, risk-benefit of using CVU should be considered and, after its placement, the best position

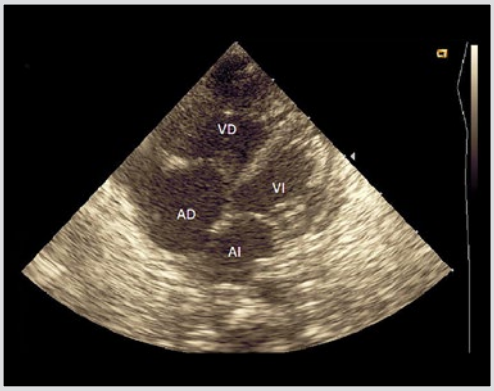

Figure 4. *Echocardiogram after pericardiocentesis.*

Figure 5. *Sobsequent chest x-ray film.*

for its tip is recommended in the insertion of the inferior vena cava (IVC) with the right atrium or thoracic portion of the IVC[10]. A chest x-ray is essential to determine the depth of insertion and to corroborate a satisfactory insertion in order to minimize complications[11]. Any catheter tip placed in the right or left atrium is associated with higher rates of complications[12]. There are multiple case-reports of neonates complicated with cardiac tamponade associated with umbilical venous catheter[5,9,13-16]. Its pathogenesis can be associated with cardiac wall or vascular erosion owing to contact with the catheter tip leading to perforation. Another possible mechanism of myocardial wall lesion is osmotic harm caused by hypertonic solutions infused through the central venous line[17].

Cardiac tamponade occurs when there is fluid accumulation in the pericardiac cavity, with volume sufficiently large as to prevent filling of the heart in diastole. In infants, tachycardia can sometimes be the only symptom present, and it can even cause sudden death without significant previous signs and symptoms being present[18].

The diagnosis is mainly due to high suspicion, when there is previous placement of CVC, with cardiac shape augmentation, together with persistent tachycardia or sudden cardio-respiratory instability.

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