Cardiac tamponade caused by central venous catheter in two newborns

Tamponamento cardíaco em dois recém-nascidos causado por cateter umbilical

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Abstract
Cardiac tamponade secondary to the use of central venous catheter is a rare complication; however, it is potentially reversible when it is caught in time. We report two cases of cardiac tamponade that was diagnosed using a transthoracic echocardiography, followed by urgent pericardiocentesis and surgical pericardial drainage as a complication from umbilical venous catheterization. In one case, the tip of the catheter was properly placed, and in the other case, it was not. In both cases, a hyperosmolar solution was being injected. Although it may be an uncommon situation, it should be always considered as a possibility in a newborn who develops cardiogenic shock without an apparent cause.


INTRODUCTION
Cardiac tamponade in newborns manifests with unspecific signs, and caution must be taken when diagnosing it. Respiratory insufficiency and circulatory shock are initial aspects that culminate in bradycardia and cardiorespiratory arrest. Upon physical examination, hypophonesis of cardiac sounds may be present. Ideally, the presence of pericardial effusion can be confirmed by echocardiogram and, in the case of signs of restriction to filling of the cavities, pericardiocentesis should be performed as soon as possible. In the case of eventual cardiac arrest with the diagnosis of pericardial effusion, pericardiocentesis should also be promptly established.

The catheterization of the umbilical vein is widely used in neonatology units as venous access and parenteral administration route. Pericardial effusion and cardiac tamponade are complications caused by umbilical vein catheterization. There are reports in the literature of newborn patients who died or became severely ill as a result of cardiac tamponade after umbilical catheterization [1,2]. These complications occur in up to 3% of the newborn cases with...
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in the operating room when we noted the presence of about 20 ml of liquid (with the same characteristics as the previous drained liquid), and the tip of the umbilical catheter had perforated the inferior vena cava inside the pericardial sac and blood clots. The umbilical venous catheter was removed without evidence of active bleeding, and the pericardial cavity was washed with 80 ml of warm saline solution. Drain-14 was inserted. The intubated patient was referred to the neonatology unit and was monitored for 4 days. On the 9th postoperative day, the patient was discharged from the neonatology unit.

DISCUSSION

The pericardial effusion physiopathology in newborns with central venous access catheter is uncertain. It can occur from a direct lesion from the tip of the catheter during its insertion, or, later, from migration or from wall necrosis caused by infusion of hyperosmolar solution. Some authors believe that the perforation is secondary to the repeated contact of the central catheter, causing lesions on cardiac walls or vessels, resulting in the formation of thrombus and adherence of the catheter to the vessel wall. Transmural lesion may be caused by the injection of hyperosmolar solution [3].

Pericardial effusion development usually occurs on the 3rd or 4th day after catheterization [2,3]. In our two cases, the
event was diagnosed on the 5th and 2nd day after catheterization, respectively. In both cases, the initial suspicion was sepsis.

Beardsall et al. [4] analyzed the number of central venous lines positioning and the number of pericardial effusions and/or cardiac tamponade over the course of 5 years in neonatology units of the United Kingdom. We analyzed about 46,000 central lines, and found that pericardial effusion and/or cardiac tamponade occurred in 1.8 / 1000 venous lines inserted, and found death as a result of this complication in 0.7 / 1000. Among the 82 cases of pericardial effusion and/or cardiac tamponade, 34 (41%) occurred in units that inserted less than 50 lines per year, and only 20 (24%) in units that inserted more than 100 lines per year (p = 0.005). In 20 cases, the diagnosis occurred only during the autopsy.

Around the world, bedside chest radiography has been method most often used to certify the location of the umbilical catheter, and this is also the case in Brazil. Ideally, the tip of the umbilical catheter should be located at the connection of the inferior vena cava with the right atrium. Several studies have shown an incorrect positioning in patients who had correct location during the radiological examination and who underwent echographic examinations [5,6]. Only one of our patients had the tip of the catheter in the appropriate location. In the other, the tip was located in the pulmonary artery and was not mobilized. We consider such behavior inappropriate; a repositioning should have been performed.

Cardiac tamponade in newborns can occur not only as a result of the umbilical vein catheterization, but also after installing a peripherally inserted central catheter (PICC). Nadroo et al. [7] report three deaths caused by cardiac tamponade out of 390 placements of PICC. Nowlen et al. [2] reported 14 cases of pericardial effusion in newborns with deep venous access in six different units of neonatology over 2 years. This author also reported another 47 cases that were in the literature between 1970 and 1999. Among a total of 61 cases, the highest occurrence was found in cases that used the umbilical catheter (21 patients - 34.5%). The 14 patients in the series of the authors were receiving parenteral nutrition through the central venous catheter. Among our cases, one was receiving parenteral nutrition exclusively, and only one was using dextrose.

There are insufficient data in the literature to prove the highest occurrence of pericardial effusion between different types of material used for catheters. More controlled studies are needed.

CONCLUSION

Cardiac tamponade as a complication caused by the umbilical vein catheterization in newborns is rare, but serious and can occur even in cases in which the catheter is properly positioned. This complication should be considered in every newborn with central venous access whose condition suddenly worsens.

REFERENCES


