

Unusual Complication Of Umbilical Venous Catheterization- Leads To Pericardial Tamponade

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Citation

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Abstract

Umbilical venous catheterization, when used, special precautions should be taken and guidelines followed. We present a case of a 3660 gram infant who suffered cardiac tamponade from a hyperosmolar infusion through an indwelling umbilical venous catheter. The infant survived as a result of early diagnosis and aggressive therapeutic intervention. Cardiac tamponade secondary to central venous catheterization is rare, but potentially lethal. To avoid this complication, the catheter tip should be prevented from entering the right atrium and its position should be checked periodically by chest X-ray. Cardiac tamponade should be suspected in any patient with a central venous catheter whose condition deteriorates suddenly. Immediate evacuation of the pericardial fluid can be life saving.

Umbilical venous catheterization in neonates is an intravascular infusion route for resuscitation and maintenance fluids, blood and blood products, parenteral nutrition and hypertonic solutions that can be used as an alternative when peripheral venous access is not possible.^{1, 3} However this procedure is associated with a number of major complications.^(1,2,3) Of these untoward injuries, cardiac tamponade is the most serious and often results in a fatal outcome. This case report describes the unusual complication of cardiac tamponade secondary to transudation of fluid from a malpositioned umbilical venous catheter against the right atrial wall. This article also highlights the importance of confirming the position of the catheter tip with anteroposterior and lateral radiographs and timely diagnosis and therapeutic intervention.^{1, 2}

CASE REPORT

A 3660 gram male infant was born at 38 weeks gestation by primary cesarean section (breech presentation) with apgars of 9/9 at 1 and 5 minutes. Mother had received one dose of ampicillin during labor because of a positive cervical culture for group B streptococcus during third trimester of pregnancy. In the newborn nursery the baby had respiratory distress, desaturation and an episode of hypoglycemia. A

clinical diagnosis of sepsis versus transient tachypnea of the newborn (TTN) was made and the neonate

received intravenous antibiotics for suspected bacterial sepsis. The baby was treated with intravenous fluids due to the episode of hypoglycemia. A 5.0 french (1.7mm) umbilical venous catheter made of polyvinyl chloride (Sherwood Medical, St. Louis.MO.63103

USA) was placed due to difficult peripheral venous access. Chest X-ray revealed the catheter tip to be above the diaphragm. The infant remained in a stable condition till on the third day of life he developed increasing respiratory distress (RR 90-100/min), with tachycardia (HR - 180/min), desaturation to 88 % in room air, muffled heart sounds and hepatomegaly (liver edge about 5 cm below right subcostal margin). A chest X-ray revealed an increase in the heart size. An urgent echocardiogram confirmed the

clinical suspicion of massive pericardial effusion with impending cardiac tamponade. Infusion was stopped via the umbilical venous catheter immediately. Pericardiocentesis was done under echocardiographic guidance using a 20-gauge cannula via the xiphisternum. Approximately 50 ml of turbid fluid was obtained. The baby's condition rapidly

restabilized.

Analysis of the pericardial fluid indicated similar dextrose concentration (420 mg/dl) of the fluid as that of the hyperosmolar infusion (450 mg/dl). Intravenous vancomycin was added to the antibiotic regimen of the patient. Review of the radiographs and echocardiogram suggested that the umbilical venous catheter tip had migrated to a malposition above the diaphragm and was against the right atrial wall. There was probably transudation of the hyperosmolar fluid into the pericardial sac. The umbilical venous catheter was uneventfully removed after the pericardiocentesis, after which the a

repeat chest X-ray showed a normal cardiac silhouette and echocardiogram revealed good biventricular systolic function with no further pericardial effusion. The patient was discharged home in 10 days.

DISCUSSION

The use of umbilical venous catheters for hyperalimentation has been increasing in the neonatal period. Pericardial effusion and pericardial tamponade are rare in the newborns. Few cases of cardiac perforation secondary to central venous catheters have been reported. This complication is likely to be overlooked and the outcome can be detrimental. The primary etiology of cardiac perforation is inappropriate placement or migration of the catheter within the heart. (3,4,5) It is postulated that movement of the

head and neck, respiration and even the normal cardiac cycle are associated with catheter migration.^{8, 9} The perforation can be caused either by direct puncture or from endothelial damage by the hypertonic solutions, and high pressure infusions. (1,4,6) Such damage may cause thrombus formation and myocardial necrosis, resulting in leaked fluid accumulation in the pericardial space. The use of radiography to determine the catheter tip position has been evaluated by a number of authors. (11,12) The optimal position for catheter is at the junction of the inferior vena cava and the right atrium with the tip visible between the 8th and 9th thoracic vertebrae. Malposition has been defined either as a catheter tip visible above 7th vertebra with significant potential for migration, or as a

position below inferior vena cava and right atrial junctional with potential intra or extra-hepatic complications. (11,12,¹³) Radiographic identification is mandatory to make sure that the catheter is in a correct position. Well-centralized antero-posterior view should show a venous catheter ascending

straight or curving slightly to the right and a lateral view assesses whether the tip is above or below the diaphragm or in a potentially hazardous position. If an infant receiving an infusion with a central venous catheter has sudden cardiovascular deterioration and is unresponsive to conventional intensive resuscitation, cardiac tamponade should be strongly suspected. Cardiac auscultation can identify muffled heart tones. If this complication is suspected, time should not be wasted on radiographic confirmation, arterial blood gas sampling, electrocardiography or any other diagnostic procedure. To start with, the infusion be stopped and an attempt made to aspirate from the pericardial space via the catheter. (1,2,7) If this attempt is successful, it signifies pericardial effusion which can be confirmed by echocardiography. If significant improvement is not achieved, immediate pericardiocentesis must be performed, preferably after echocardiography.

CONCLUSION

Umbilical venous catheterization is commonly used in the management of severely ill neonates. However, when central venous catheterization is undertaken, the operator must adhere to guidelines regarding indications, techniques and be aware of the possible complications, its prevention and management.

It is mandatory to periodically ascertain the position of the catheter tip by using antero-posterior as well as lateral radiographs.^{1, 2} Although cardiac tamponade from perforation of the myocardium by a catheter tip is a serious emergency, it is a treatable condition provided one has a high index of suspicion.

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