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## Pericardial Tamponade in a Newborn Following Umbilical Catheter Insertion

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We present a case of cardiac tamponade following umbilical venous catheterization in a neonate, an uncommon, yet potentially fatal complication. Timely diagnosis by echocardiography and urgent pericardiocentesis proved lifesaving.

**Key words:** *Cardiac tamponade; Neonate; Pericardial effusion; Umbilical venous catheter.*

Umbilical vein catheter insertion is a routine procedure in neonatal units looking after sick babies. There are reports of newborns who died or became severely ill as a result of cardiac tamponade after umbilical catheterization. In neonates with central venous catheters the incidence of cardiac tamponade is 0.5-2% [1] and mortality varies from 45-67% [2]. We describe the clinical-surgical evolution and successful resuscitation of a case of cardiac tamponade following insertion of umbilical venous catheter.

### CASE REPORT

38-week-old newborn, weighing 3.35kg was admitted to the neonatology unit with congenital pneumonia, pulmonary hypertension and shock, requiring ventilation. A silastic umbilical venous catheter (Vygon) was inserted on day one of life. Radiography post procedure showed the tip of the catheter at the level of the atrium. ECHO evaluation done for pulmonary hypertension showed a small hypochoic region at the cardiac apex suggesting

accumulation of fluid in pericardial space and catheter tip at the right atrium. Removal of the catheter was planned but the procedure was inadvertently delayed.

Two hours after the catheter placement, the neonate developed acute asystole and hypoperfusion not responding to positive pressure ventilation and external cardiac massage. One previous experience with cardiac tamponade following PICC insertion and successful resuscitation made us think of cardiac tamponade [3]. Urgent pericardiocentesis was done with a presumed diagnosis of cardiac tamponade. An emergency echocardiogram done few minutes later showed pericardial effusion and further tapping was done under sonographic guidance. Around 20 mL of clear fluid was drained. Fluid analysis showed very high glucose levels (1240 mg/dL) suggesting presence of infused dextrose in the pericardial space. The umbilical catheter was removed. Repeat ECHO showed no reaccumulation of fluid. The baby had no cardiac emergency thereafter and was discharged on day 9 of life. The baby has normal growth and development on his 9 month follow up.

In our unit, umbilical catheters are frequently inserted (around 10-12 per month) in preterm and ventilated babies. X-rays are routinely done after insertion, but ECHO confirmation of catheter tip position was not routine until we faced this emergency.

## DISCUSSION

Resistance to external cardiac compressions in a baby with acute deterioration should point to cardiac tamponade as a possibility [3]. Two mechanisms are hypothesized in catheter associated pericardial effusions: (i) perforation at the time of insertion; and (ii) slow damage to the integrity of the vascular wall, resulting in either transmural diffusion of infusate or erosion of the line into the pericardial space [1]. Pericardial effusion is most commonly described with catheter tips placed within the heart outline on X-ray examination, when endocardial damage from a fluid jet from looped catheter is the likely explanation. Extravasation may occur as the result of the catheter tip being in a small vein or pointing at the wall of a large vessel or cardiac chamber.

A recent Department of Health Review, UK of four neonatal deaths by catheter associated cardiac tamponade concluded that right atrial tip placement should be avoided [4]. Schulman, *et al.* [3] opine that placements within the RA should be withdrawn so that the tip lies in the inferior vena cava or SVC. X-ray pictures though helpful, give limited information about line positioning because of the difficulty of naked eye in discrimination of catheter and soft tissues, and the inability of a 2D image to illustrate the complex 3D structure of the heart and great vessels. Even careful radiographic monitoring with use of radio-opaque dye will not reveal line curvature in the plane of the radiographs [1]. Contrast injection may under- or overestimate catheter length, because the catheter may be either

partially filled or extrude a jet of contrast from the tip at the time of the X-ray examination. It is also advocated that dye be injected at the time of initial placement rather than on a regular basis [5]. Central catheters should be repositioned if the tip is inside the cardiac silhouette, avoiding small vessels and acute angles between catheter and vascular wall, with final tip position confirmed by ultrasound [1,4]. Digital images may also make line tip identification easier.

Catheter should be well secured to avoid migration of tip. Early signs of pericardial effusion should be recognized, including unexplained cardiovascular decompensation and enlarging cardiac silhouette on X-ray examination. Echocardiography will readily reveal the diagnosis. Urgent pericardiocentesis is essential to prevent mortality or serious consequences.

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