Incidental Intraoperative Detection of Central Venous Catheter-related Internal Jugular Vein Thrombus in an Infant with d-Transposition of Great Arteries

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Dear Editor,

A 25-day-old male' baby weighing 3.1 kg presented with bluish discoloration of lips and tachypnea. On examination, the pulse rate was 140/min with palpable peripheral pulses, SpO_2 of 65% at room air in all four limbs, and there was no audible cardiac murmur. Complete blood picture showed hemoglobin of 16 g/dl and hematocrit of 50%. Transthoracic echocardiography (TTE) showed features of d-transposition of great arteries (d-TGA) with intact ventricular septum and small PDA. A continuous infusion of alprostadil was planned. Since peripheral venous access was difficult, a 4.5 F triple-lumen central venous catheter (CVC) was inserted into the right internal jugular vein (IJV) under ultrasound guidance. Intravenous fluid and alprostadil infusion were commenced after confirmation of correct placement by free aspiration of the blood from all three ports and with chest X-ray. Due to poor response to alprostadil infusion, the child was posted for balloon atrial septostomy under general anesthesia. After septostomy, the SpO_2 improved to 88% on room air, and the child was extubated. Two days later, the child was posted for arterial switch operation (ASO). In the operation room, there was the absence of free aspiration of venous blood from the distal port of CVC. After anesthesia induction and endotracheal intubation, ultrasound imaging of the right IJV revealed the presence of thrombus with CVC *in situ* [Figure 1]. A TTE examination was prompted to look for any extension of thrombus into cardiac chamber. The latter disclosed the absence of thrombus in the right atrium [Figure 2]. Due to possible risk of systemic embolization associated with CVC removal, it was left *in situ* and another CVC was inserted into the right femoral vein. Cardiopulmonary bypass (CPB) was instituted with a single inferior vena cava (IVC) drainage cannula and aortic cannulation after systemic heparinization. The right atrium was opened after administration of cardioplegia, and thrombectomy of superior vena cava (SVC)/IJV was performed using Fogarty catheter. A SVC drainage was then placed, and ASO with atrial septal defect closure was performed. The CPB time was 150 min and aortic cross-clamp time (ACT) was 100 min. The child was weaned off CPB with milrinone 0.5 µg/kg/min and adrenaline 0.05 µg/kg/min. Anticoagulation was reversed with protamine, and ACT was 140 s. The child was shifted to the intensive care unit (ICU) with open sternum as per the institutional protocol. In the ICU, ultrasound of the right IJV revealed the absence of thrombus and the CVC was removed. The child underwent delayed sternal closure the following day and was extubated

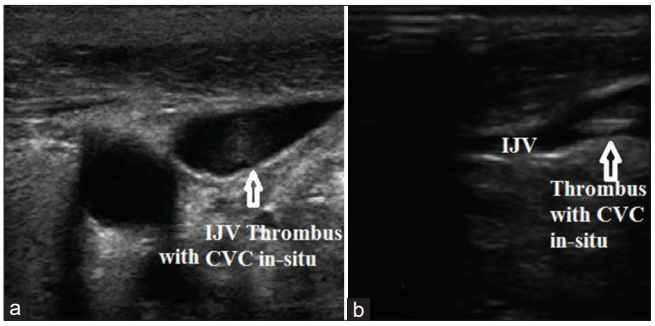

Figure 1: Ultrasound image showing the presence of thrombus in the right IJV with CVC *in situ*. (a) Short-axis view and (b) long-axis view of IJV. IJV: Internal jugular vein, CVC: Central venous catheter

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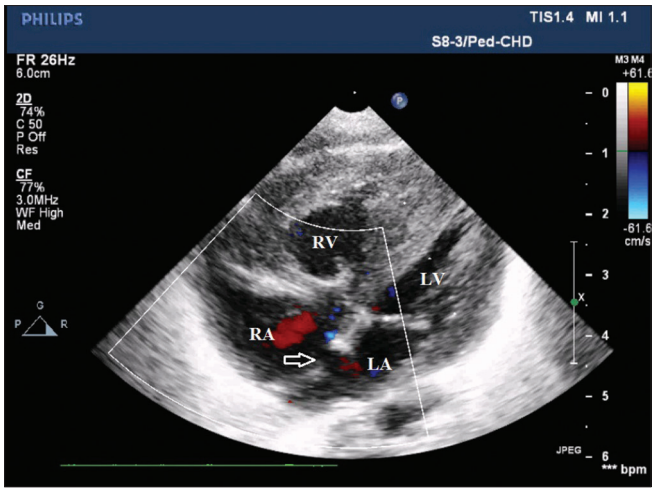

Figure 2: Subcoastal transthoracic echocardiography 4-chamber view showing the absence of thrombus in the right atrium and atrial septal defect post-BAS (white arrow). BAS: Balloon atrial septostomy

on postoperative day 3 without any neurological deficits. The workup for hypercoagulable conditions was negative. The rest of the hospital stay was uneventful, and the child was discharged on postoperative day 12.

CVC line occlusion is a common problem in infants and often occurs secondary to thrombosis.[1] The incidence of neonatal jugular vein thrombosis as an early complication has been reported to an amount between 6% and 23%.[2] The common sites of CVC-related thrombus formation are CVC lumen (intraluminal), site where CVC enters the vein, CVC tip and along the external surface of the CVC. Several risk factors for neonatal CVC thrombosis are small for gestational age, indwelling time, catheter type (silastic vs. polyurethane) and size, addition of blood products to infusate, malpositioned CVC, and polycythemia.[1,3] In the present case, the high hematocrit associated with cyanotic congenital heart disease would have contributed to CVC-related IJV thrombosis. IJV thrombosis is asymptomatic in most patients. Complications such as cerebral edema and acute pulmonary thromboembolism although rare can occur.[4] However, in d-TGA, as in our case, due to ventricloarterial discordance, there is a possibility of systemic embolization as the right ventricle ejects the blood into aorta.

Ultrasonography has been shown to be an adequate method for the evaluation of clinically asymptomatic jugular vein thrombosis.[2] In the present case, detection of IJV thrombosis by ultrasound led to change in the surgical management wherein the SVC cannulation was not attempted until CPB with cardiac standstill was established due to possible risk of systemic embolization.

To conclude, CVC-related thrombosis should be suspected in infants with malfunctioning CVC and should be evaluated with ultrasound. Appropriate measures should be instituted to avert the consequences of CVC-related IJV thrombosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the parents have given the consent for the baby's images and other clinical information to be reported in the journal. The parents understand that the baby's name and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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