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SHORT COMMUNICATION

Successful use of recombinant tissue plasminogen activator (r-TPA) for management of chylothorax associated with central venous thrombosis after neonatal cardiac surgery

Sameh R Ismail *, **Mahmoud Elbarbary**, **Mohamed S Kabbani**

King Abdul-Aziz Medical City, King Saud University for Health Sciences, Department of Cardiac Sciences, National Guard hospital Health Affairs, Riyadh, Saudi Arabia

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KEYWORDS

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Abstract Postoperative chylothorax is a frequently encountered pathology occurring in up to 5% of patients undergoing surgery for repair of congenital heart disease. Neck vein thrombosis can be associated with chylothorax and may contribute to its severity and duration. Furthermore, neck vessel thrombosis resulting in permanent vessel occlusion may hinder future management, diagnostic studies and cardio-surgical interventions. In this report we are describing a neonate who developed chylothorax on the 7th post-operative day following open-heart surgery. The chylothorax was linked to venous thrombosis in the cannulated right internal jugular vein with thrombus extending to the right atrium. After using low dose tissue plasminogen activator (r-TPA) infusion, the thrombi disappeared and the chylothorax resolved with no complications.

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1. Case report

A newborn boy, weight 3 kg was diagnosed with transposition of great arteries, intact ventricular septum, atrial septal defect and patent ductus arteriosus. The patient was referred to us from a primary care centre at the age of 9 days. On admission the patient had umbilical venous catheter with prostaglandin infusion, the patient was suspected to be septic, and the umbilical catheter was inserted immediately after birth, so antibiotics started and UVC was replaced with a 4 French, double lumen, right internal jugular (RIJ) central venous line (CVL). Catheter insertion was done with ultrasound guidance and was reported to be smooth and uneventful, and kept on fixed low dose heparin of 10 μ/kg/h for line patency.

At 14 days of life, the patient underwent an arterial switch operation and RIJ catheter was still in situ being used for the infusion of the inotropic support and for invasive monitoring, and a left atrial line inserted surgically to help monitoring left atrial pressure. Shortly after surgery there was minimal drainage from the single mediastinal tube. After the 5th post-

* Corresponding author at: Department of Cardiac Sciences (MC: 1420), King Abdul-Aziz Medical City P.O. Box 22490, Riyadh 11426, Saudi Arabia. Fax: +966 118011111x1697116855.
E-mail addresses: samis93@gmail.com (S.R Ismail), Barbarym@ngha.med.sa (M. Elbarbary), kabbanim@ngha.med.sa (M.S Kabbani).
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operative day, the patient developed thrombocytopenia that was managed with antibiotics presuming septic related causes. Blood cultures remained negative. Echocardiography (ECHO) at that time showed, no residual defects, and no thrombi or vegetations in the heart or major veins. On the 7th post-operative day significant right-sided pleural effusion developed which required chest tube insertion and drainage of a significant amount of milky fluid that was confirmed by laboratory analysis to be chyle. The patient was kept nil per mouth (NPO) along with total parenteral nutrition administration. Doppler ultrasound of neck vessel showed thrombosis of right internal jugular vein with thrombus extending to right atrium (Figs. 1 and 2). Additionally ECHO at that time showed two thrombi, one in the Right Atrium (RA) measuring (0.6×1 cm) and the other in the Left atrium (LA) (0.5×0.7 cm) (Fig. 3). We investigated the patient for possibility of hyper-coagulable disease, but all investigations were negative. The patient was managed conservatively with anti-coagulation in form of fractionated heparin infusion with no evidence of clinical improvement in venous obstruction despite satisfactory anticoagulation (PTT: double the control value). Furthermore, the chyle drainage remained significant averaging 64 ml/kg/day and total of 1.5 l in 8 days. The risk/benefit ratio of using (r-TPA) infusion in recently operated neonate was discussed and judged to be in favor of benefits to start low dose (r-TPA) (0.05 mg/kg/h) for 6 h followed by heparin infusion. We repeated ECHO 24 h after the first dose of (r-TPA) infusion and the RA thrombus was noted to be smaller in size, while the LA thrombus completely disappeared (Fig. 4), so a second low dose (r-TPA) over 6 h was also ensued. ECHO and ultrasonography imaging after the second (r-TPA) dose showed complete resolution of the thrombi in the RIJ vein (Fig. 6), and in both atria, with simultaneous dramatic decrease in the chylothorax drainage followed by complete recovery and there were no complications (Fig. 5), Head ultrasound was done before and after (r-TPA) and ruled out any cerebral hemorrhage.

2. Discussion

Venous thromboembolic disease (VTE) is an increasingly recognized clinical entity in children who are surviving serious

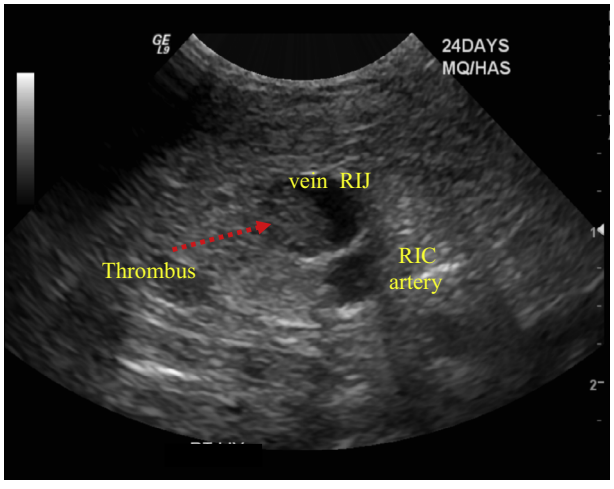

Figure 1 Ultrasound picture showing short axis view for the neck vessels with partial thrombosis of the right internal jugular vein. RIJ: Right internal jugular, RIC: right internal carotid.

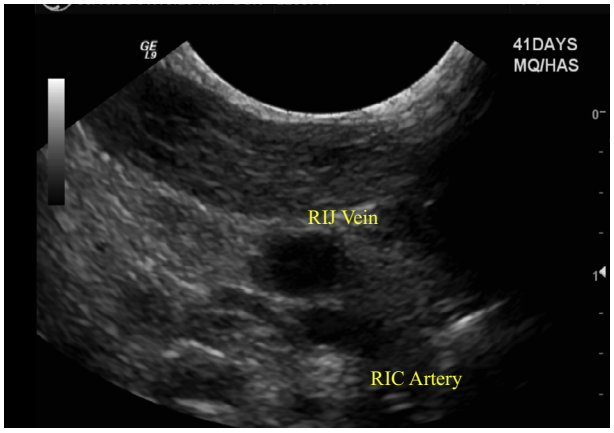

Figure 2 Ultrasound picture showing short axis view for the neck vessels resolution of the thrombosis of the right internal jugular vein after r-TPA. RIJ: Right internal jugular, RIC: right internal carotid.

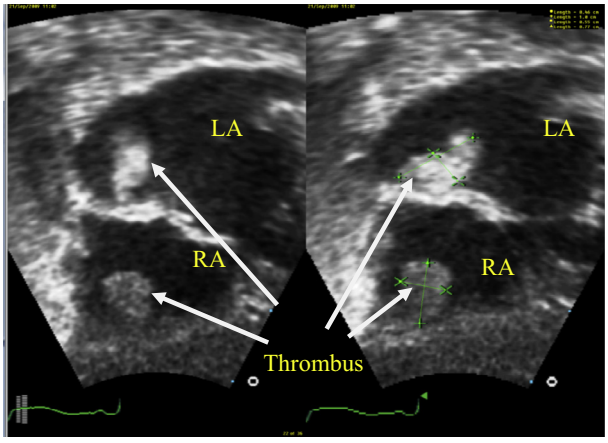

Figure 3 Trans-thoracic ECHO picture, subcostal Biatrial view showing two thrombi, one in the Right Atrium (RA) measuring (0.6×1 cm) and the other in the Left atrium (LA) (0.5×0.7 cm). RA: right atrium, LA: left atrium.

underlying disorders such as congenital heart disease (CHD). Children with CHD are the largest identifiable group accounting for 1/3 of children with venous thrombosis.[1] In the general pediatric patient's population, the most important risk factor for VTE is the use of Central venous lines (CVL), which are present in 30–70% of children with VTE.[2,3] Central venous lines appear to be major risk factors for VTE, based on the close anatomical relationship found between catheters position and thrombi location.[4] Pathogenic mechanisms of CVL related VTE include vessel wall trauma at insertion site, obstruction of venous flow, endothelial damage by CVL adhering to the venous wall, and the intravascular presence of a foreign surface.[5,6] About two thirds of VTE in children occur in the upper venous system reflecting the most common location of CVL placement.[3] There is major variability in the reported prevalence of VTE in pediatric population. Petaja et al. described a prevalence of VTE after pediatric surgery, which was higher in neonates 5.8% compared to non-neonates 1.1%. Mortality was (40%) in children with VTE compared to non-VTE (8.3%) ($P < 0.001$).[21] In another prospective randomized

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