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A Cardiac Mass in a Neonate

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Case Presentation and Hospital Course

A female infant was born via vaginal delivery at 33 0/7 weeks to a 35-year-old gravida 7, para 3, mother with hypertension and preeclampsia. The mother also had poorly controlled type 2 diabetes mellitus, a previous postpartum deep vein thrombosis, and a small pulmonary embolism. The infant's birth weight was 1744 g, and the Apgar scores were 9 and 9 at 1 and 5 minutes, respectively. She was transferred to the neonatal intensive care unit for routine management of prematurity.

Due to severe, persistent hypoglycemia, an umbilical venous catheter (UVC) was placed on day of life (DOL) 2, with a maximum glucose infusion rate of 21 mg/kg/min. A systolic murmur heard on DOL 5 led to an echocardiogram that showed a small patent ductus arteriosus and the UVC tip at the foramen ovale resulting in removal of the UVC.

On DOL 7, she developed fever, tachypnea, and grunting. Complete blood cell count was significant for thrombocytopenia (platelets 81 000 bil/L). Blood culture and cerebrospinal fluid studies were collected and she was started on gentamicin, vancomycin, and acyclovir. Due to inadequate intravenous access, persistent hypoglycemia and the need for antibiotics, a peripherally inserted central catheter was attempted but failed. On DOL 8, she had multiple episodes of bilious emesis, but abdominal ultrasound and upper gastrointestinal studies were negative. A cranial ultrasound showed bilateral grade 1 intraventricular hemorrhages (IVH). Under fluoroscopic guidance, a Broviac catheter was inserted into the right internal jugular vein. Blood culture grew methicillin-sensitive *Staphylococcus aureus* sensitive to cefotaxime in less than 24 hours, but the cerebrospinal fluid yielded no growth. Acyclovir was discontinued and cefotaxime was added.

On DOL 10, a repeat echocardiogram revealed a 5 × 5 mm mass in the atrial septum at the level of the foramen ovale in contact with the tip of the central line (Figure 1). The Broviac was pulled back under echo guidance until it was no longer in contact with the mass, but the mass persisted at the level of the foramen ovale. Anticoagulation was withheld due to the risk of progression of the IVH.

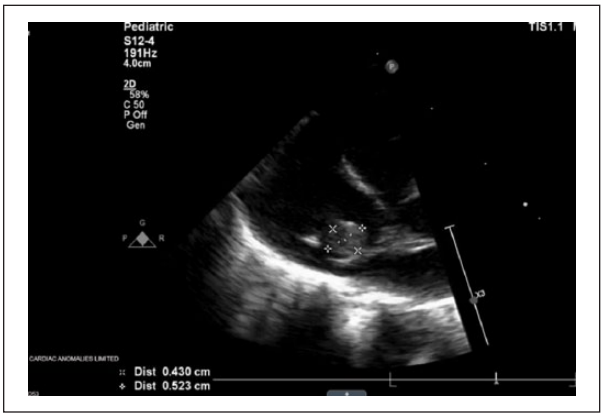

Figure 1. Echocardiogram showing the medium size mass (5 × 5 mm) in the atrial septum at the level of the foramen ovale at the tip of the central line, which is in close contact with the atrial septum.

A repeat echocardiogram on DOL 11 showed a questionable increase in the size of the mass but then a gradual decrease until no mass was seen on DOL 23. Repeated cranial ultrasounds were stable. On DOL 17, two 1-cm nodules on the right side of the scalp and right leg were debrided and grew methicillin-sensitive *Staphylococcus aureus*. She completed a total 42-day course of nafcillin and 21-day course of gentamicin before the Broviac was removed. Echocardiograms 1 month after discharge were stable and she had no other sites of infection.

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Final Diagnosis

Intra-atrial cardiac mass, methicillin-sensitive *Staphylococcus aureus*, treated conservatively.

Discussion

Low birth weight and premature neonates often need central access for total parenteral nutrition, hypoglycemia, continuous monitoring, and prolonged antibiotics. Although a peripherally inserted central catheter or Broviac should ideally be positioned at the junction of the inferior vena cava and the right atrium, the subsequent development of an intracardiac thrombus, specifically in the right atrium, is a well-documented complication.[1,2] The central venous catheter (CVC) produces endocardial damage that becomes the nidus for thrombosis and nonbacterial endocarditis, which, subsequently, can become infected. The mass poses a risk for obstruction leading to heart failure or the superior vena cava syndrome, as well as pulmonary embolization, septic embolization, or paradoxical embolism, all of which can be fatal.

Organized intra-atrial thromboses have been reported in asymptomatic premature infants without complete resolution, and with no intervention.[3] Inappropriate location of the tip of the CVC, prolonged use, and repeated manipulation can lead to thrombus formation, particularly if the catheter is located across the patent foramen ovale or in close contact with the atrial septum.

Treatment typically consists of antibiotics and anticoagulation. If positive blood cultures or the mass persist despite antibiotics, anticoagulation has been effective.[4] Urokinase and heparin have been used but could be dangerous in preterm infants with intraventricular hemorrhage. Recombinant tissue type plasminogen activator has achieved dissolution of thrombi without any hemorrhagic complications. In tissue plasminogen activator–treated neonates, there were minimal changes in the coagulation profiles and serial cerebral ultrasounds showed no hemorrhages.[5]

Our patient had persistent positive blood cultures despite 5 days of intravenous antibiotics and a questionable increase in the size of the mass after 4 days of antibiotics. The bilateral grade 1 IVH mitigated against the use of Recombinant tissue type plasminogen activator. Although Ferrari et al[5] showed no changes in the coagulation profiles, none of their patients had an IVH.

Conclusion

We describe the case of a cardiac thrombotic mass with superimposed infection in a preterm infant that resolved with conservative management. Although there is a tendency to treat such masses with anticoagulation, this increases the risk of hemorrhage, particularly in the presence of an IVH. Prolonged antibiotic use can be successful in treating the infection while there is spontaneous resolution of the mass. Regardless of symptoms, patients with prolonged CVC use require echocardiographic monitoring for the development of asymptomatic thrombi.

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Author Contributions

MEE: Drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
FA: Drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
IEGR: Critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
MRE: Critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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