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Organized intra-atrial thrombus in growing premature infant

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Abstract

We report interesting echocardiographic images of the atrial septum in two growing premature infants related to the previous use of umbilical venous lines in the neonatal period. Complications related to central venous lines are well documented but when they are identified in follow up after several months, their relevance is difficult to establish. Atrial septal findings of organized clot in these asymptomatic infants needs to be correlated with details of neonatal care.

MeSH: Neonates, Catheter-Related Infections, Catheters, Indwelling, Foramen Ovale

Introduction

Central venous lines (CVL) are frequently used in the supportive care of premature infants for intravenous fluids, prolonged antimicrobial therapy and total parenteral nutrition. Complications related to CVL in newborns include venous thrombosis/embolism, persistent sepsis, endocarditis, arrhythmias and cardiac tamponade.¹ We present echocardiographic images of the inter-atrial septum in two asymptomatic growing premature infants, caused by organized thrombus.

Case Reports

A 5 month old infant, 26 weeks premature, was referred for the evaluation of a heart murmur. The infant had had an 8 weeks stay in a neonatal intensive care unit which was complicated by the prolonged need for total parenteral nutrition, multiple courses of antimicrobials including amphotericin, grade III intracranial hemorrhage and chronic lung disease. Echocardiography showed an echogenic area in the fossa ovalis resembling a double disc septal occluder, without shunting (Figs 1 and 2). A review of the hospital records showed that the infant had an umbilical line in the right atrium close to the foramen ovale.

Figure 1 Echogenic area of fossa ovalis due to organized clot

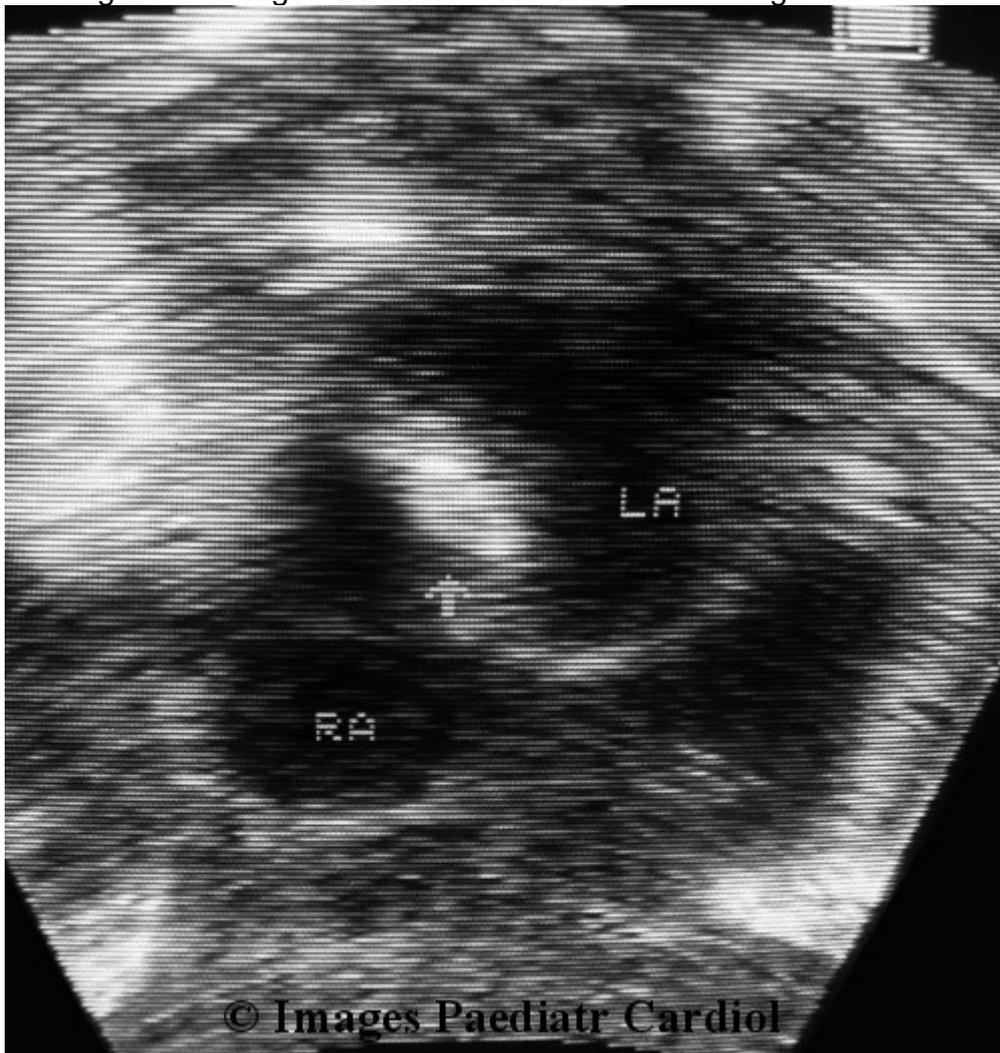
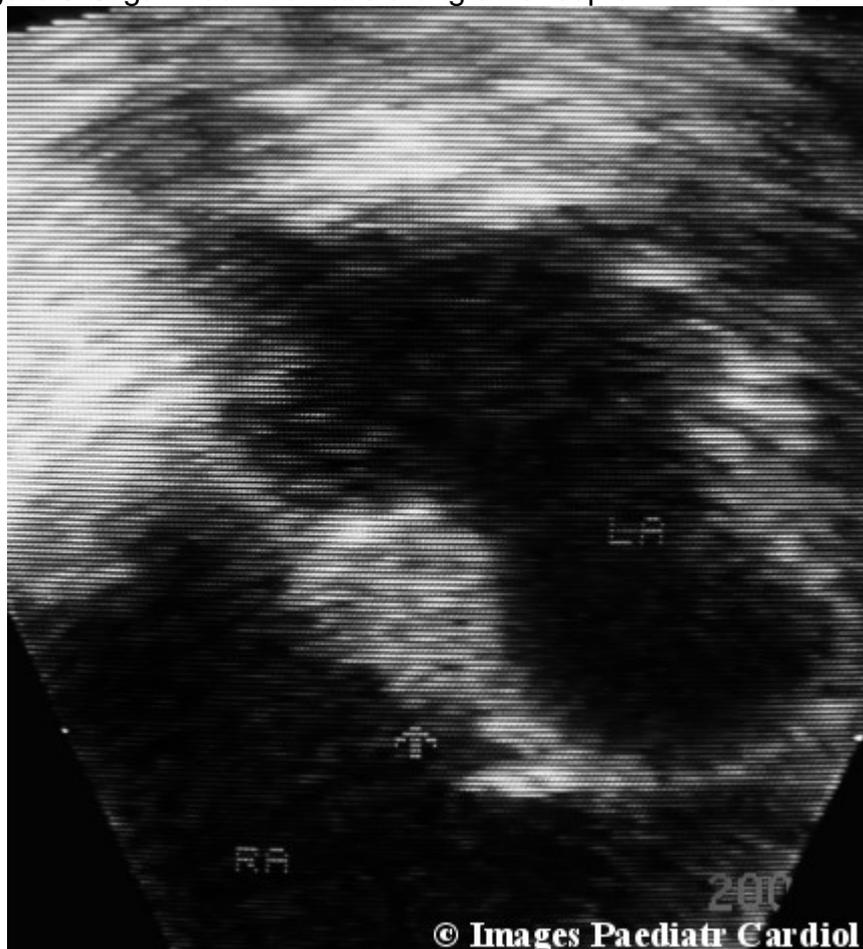


Figure 2 Echogenic area of fossa ovalis due to organized clot



A 4 month old infant, 28 weeks premature with a similar clinical course to the previous case was referred for the evaluation of a heart murmur. Echocardiography showed an organized thrombus on the fossa ovalis area of the atrial septum on the left atrial side without shunting (Fig 3). A review of the hospital records showed that the infant had an umbilical line going through the foramen ovale to the left atrium.

Figure 3 Organized thrombus along atrial septum on left atrium side



Discussion

Several possible mechanisms by which CVL causes thrombosis include damage to vessel walls, disrupted blood flow, infusion of substances such as parenteral nutrition that damage endothelial cells and thrombogenic catheter materials.^{2,3} The ideal location of the tip of a CVL is preferably outside the cardiac chambers. The risk of thrombus formation is low with proper precautions when the catheter tip is in the superior or inferior vena cava due to laminar blood flow, but inside the cardiac chambers, this risk increases significantly due to endothelial damage secondary to the beating heart and flow disturbances around the catheter tip.³ The organized thrombi discussed in this paper, along the interatrial septum, were related to the prolonged use of umbilical venous lines for the management of extremely premature newborns in both cases. The lesions described in our cases are more often with umbilical lines rather than other central lines as umbilical catheters tend to stream toward the fossa ovalis and their position can move during extended periods of use due to manipulations. Umbilical lines can cross over to the left atrium through foramen ovale during such manipulations and are associated with significant risk of systemic embolism. When the tip of CVL is intracardiac in position based upon chest x-ray, periodic monitoring is essential and echocardiography is an ideal tool.⁴ The secondary risks involved with intra-atrial clot include persistent bacteraemia, endocarditis and the potential for embolism.^{4,5} Organized clots with secondary changes in adjacent tissues that appear quiet echogenic have virtually sealed off the atrial communications in both cases. Such cases do not need anticoagulation but require periodic follow up. Both infants are doing well at followup (two years) and the echocardiographic images of the atrial septum are unchanged.

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