ESC European Society of Cardiology

European Heart Journal - Case Reports (2023) **7**, 1–4
https://doi.org/10.1093/ehjcr/ytad312

CASE REPORT
Cardiovascular imaging

Spontaneously disappearing right atrial mass in a preterm infant: a case report

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Received 23 September 2022; first decision 18 October 2022; accepted 10 July 2023; online publish-ahead-of-print 19 July 2023

Background There is currently a lack of evidence-based guidelines regarding ideal management of a neonate, specifically a preterm, with thrombo-embolus. There are no clear guidelines as to the time-frame of spontaneous resolution of a thrombo-embolus.

Case summary A large pedunculated right atrial mass was identified on a clinician-performed cardiac ultrasound in a preterm neonate. The mass was smaller than half of the atrial size and was not causing obstruction. The mass disappeared spontaneously within 6 days and was retrospectively presumed to have been a thrombus. The neonate remained asymptomatic with no signs suggesting that the mass may have embolized.

Discussion In this case of an incidentally identified asymptomatic intracardiac mass in a preterm infant, presumed to be a thrombus, our conservative 'wait and watch' approach was not associated with any adverse pulmonary or systemic effects.

Keywords Neonatal • POCUS • Atrial • Tumour • Thrombus • Case report

ESC Curriculum 2.2 Echocardiography • 6.8 Cardiac tumours • 9.4 Thromboembolic venous disease

Learning points

- An atrial mass on neonatal echocardiogram may have a number of differential diagnoses.
- Point-of-care ultrasound scan (POCUS) may help to diagnose cardiac conditions that may otherwise have been missed or delayed where echocardiography may not be available or not clinically indicated.
- An atrial thrombus may not require thrombolysis and may resolve spontaneously within days.

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Handling Editor: Suzan Hatipoglu
Peer-reviewers: Edgar Francisco Carrizales Sepulveda; Vasilios Giampatzis
Compliance Editor: Franca Morselli

Introduction

Using point-of-care ultrasound scan (POCUS), neonatologists may diagnose congenital heart disease that may have been missed on the antenatal scans.[1]

Summary figure

Age (days)	Event
0	Birth
0.6	Diagnosis of right atrial mass by point-of-care ultrasound scan (POCUS) at 14 h of age
5.7	POCUS showing complete disappearance of right atrial mass
66	Normal echocardiogram

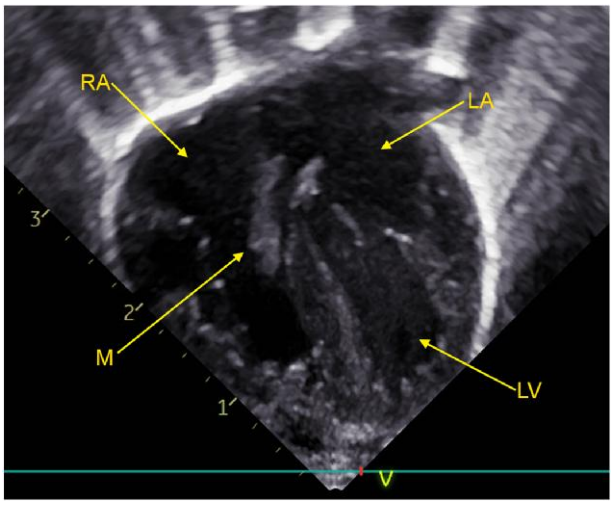

Figure 1 Apical four-chamber view showing mass (M) in the right atrium on the day of diagnosis. RA, right atrium; LA, left atrium; and LV, left ventricle.

Intracardiac masses are rare in neonates, and the prevalence is unknown. Case reports document findings in neonates who usually had indications for further investigation. The incidence of tumours in neonates may be extrapolated from studies reporting antenatal foetal findings.[2]

Masses may increase in size and potentially cause obstruction, embolization, or conduction abnormalities. Infectious 'pseudo tumours' need treatment of the infection itself. If seen, an intracardiac mass requires prompt diagnosis[3] and then surveillance and/or specific management which may include surgical resection.[2]

We present a case of a right atrial mass, assumed to be a thrombus, in a preterm neonate, with spontaneous resolution within 5.7 days.

Case presentation

Our patient was born at 25 weeks and 5 days with a birth weight of 1000 g; the morphology scan and two growth scans were normal.

Before birth, chorioamnionitis was clinically suspected and the mother received intravenous antibiotics; her inflammatory markers were elevated. Subsequent placental histopathology showed evidence of maternal and foetal amniotic fluid infection, but no thrombi.

Birth was by normal vaginal delivery following the spontaneous onset of preterm labour and rupture of membranes just before the birth. Apgar scores were 9 and 9, and the newborn was managed with mask continuous positive airway pressure (CPAP). The cord arterial lactate was 3.5 mmol/L.

The neonate did not require umbilical line catheterization; fluids were initially given via a peripheral cannula; a central line was subsequently inserted at 27 h of age.

Neonatal and maternal surface swabs taken at birth subsequently grew Group B *Streptococcus*. The baby's C-reactive protein (CRP) was 26 mg/L at 21 h of age and 10 mg/L at 66 h; admission blood culture was negative. The admission full blood count (FBC) showed haemoglobin (Hb) 147 g/L, white cell count (WCC) 9.5×10^9/L, and platelets 153×10^9/L. A repeat FBC at 8 days' age showed an Hb of 154 g/L, WCC of 36.0×10^9/L, and platelets 329×10^9/L. The neonate received 5 days of antibiotics empirically.

The serum creatinine levels were normal for age; daily urinalysis showed no haematuria. The capillary lactate levels all remained below 3 mmol/L after 12 h of age. Cranial ultrasound scans showed a small left-sided germinal matrix haemorrhage.

After initial nasal CPAP, the patient was intubated at 3 h of age for increasing FiO_2 and given Curosurf. The patient was extubated at 17 h of age to nasal CPAP, and FiO_2 remained at 0.21; the positive end-expiratory pressure (PEEP) was gradually decreased over the next few days.

The chest X-ray at 3.5 h of age showed respiratory distress syndrome only; the chest X-ray at 27 h of age showed a right upper collapse/consolidation. A repeat chest X-ray at 7 and 9 days' age, while still on CPAP, showed clear lung fields.

The initial POCUS at 14 h of age, performed to assess possible persistent pulmonary hypertension of the newborn, serendipitously showed a large pedunculated mass (*Figures 1–2* and Supplementary material online, *Videos S1–S3*) in the right atrium: width 2.9 mm × length 9.7 mm, the total size being less than half of the right atrial volume. The mass appeared to be attached to the upper right atrial wall and upper right atrial septum, and the body of this mass was floating freely in the right atrium and partially through the tricuspid valve. The inferior vena cava (IVC), superior vena cava (SVC), and pulmonary artery were clear of any masses, and all the valves appeared to be structurally and functionally normal. There was a patent ductus arteriosus (not treated) and a 6.0 mm patent foramen ovale with predominantly left-to-right flow.

Heparin and aspirin were considered but not given because of the baby's prematurity and risk of intracranial haemorrhage.

The repeat POCUS at 5.7 days' age showed no evidence of any mass in the right atrium (*Figures 3–4* and Supplementary material online, *Videos S4–S5*), and this was again confirmed on formal echocardiogram on day 66 of life.

Discussion

We describe a preterm baby who was found to have an asymptomatic mass in the right atrium; the mass disappeared spontaneously within 6 days.

The differential diagnosis of foetal and newborn intracardiac masses may be divided into three groups: (i) infectious vegetation, (ii) tumours, and (iii) thrombo-embolus (TE). All can be asymptomatic. Differentiation between the different types of intracardiac masses in a neonate can be difficult: most will appear as an echogenic mass on ultrasound scan (*Table 1*).

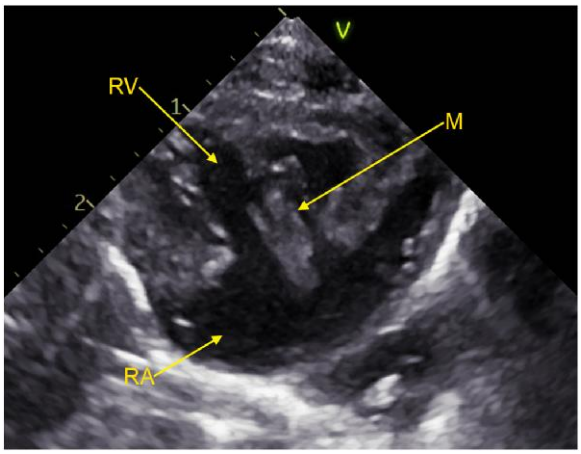

Figure 2 Parasternal long-axis view showing mass (M) in the right atrium on the day of diagnosis. RA, right atrium; RV, right ventricle.

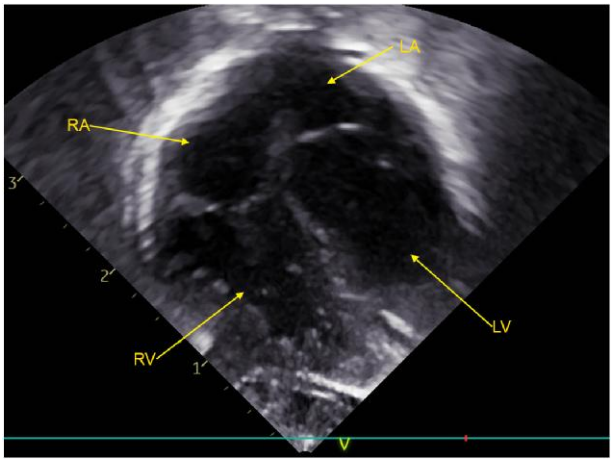

Figure 3 Apical four-chamber view (AV valves closed) showing no mass in the right atrium at 5.7 days' age. RA, right atrium; RV, right ventricle; LA, left atrium; and LV, left ventricle.

Tumours in foetuses, newborns, and children would include rhabdomyoma (60%) and cardiac fibroma (12%).[2] Other possibilities include a myxoma as well as a few other rarer possibilities. A rhabdomyoma is a large mass usually on or within the ventricular endocardium, although it may protrude into a chamber.[4] Most will spontaneously reduce in size after birth, but this would take more than 6 months.[5] A cardiac fibroma is a solid mass, almost always within the ventricular wall.[4] A myxoma has been reported in the neonatal period: typically found in either of the atria.[6] A myxoma may appear similar to a TE on cardiac ultrasound;[6] both may appear polypoid and arise from the inter-atrial septum or the atrial wall, and a myxoma is mobile and likely to prolapse through the atrio-ventricular valve, as in our case. A myxoma is not expected to decrease in size; treatment is prompt surgical excision.[7] For an intracardiac tumour, cardiotomy and resection are associated with very high mortality especially in preterm neonates, so surgical removal is best delayed unless the tumour presents with life-threatening complications.

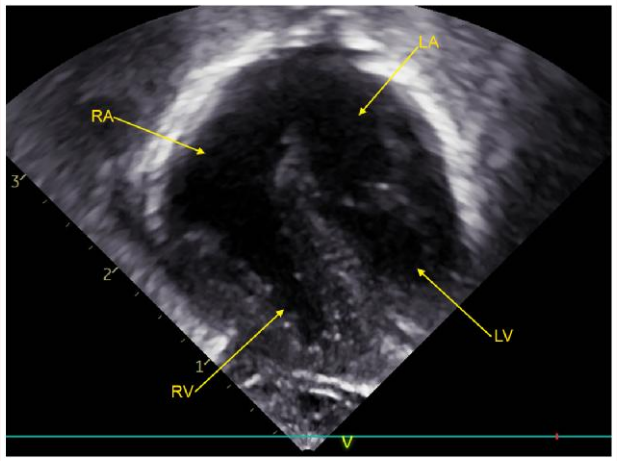

Figure 4 Apical four-chamber view (AV valves open) showing no mass in the right atrium at 5.7 days' age. RA, right atrium; RV, right ventricle; LA, left atrium; and LV, left ventricle.

Table 1 Intracardiac masses in a newborn: most common causes

	Usual site/s	Echo features
Haematologic		
Thrombo-embolus	Intracavitary or intramural	Variable: homogenous/ heterogeneous, may be pedunculated
Infectious vegetations		
Bacterial	Valves (esp. tricuspid), atrial septum	Poorly defined, heterogeneous, adherent to valve
Fungal	Right atrium, atrial septum, valves	May be large and pedunculated, mimicking myxoma
Tumours		
Rhabdomyoma	Left ventricle or interventricular septum	Homogenous, usually multiple, variable sizes, may protrude into chamber/s
Fibroma	Within interventricular septum or left ventricular wall	Large, solid, non-contractile
Myxoma	Arise from atrial septum or wall (left more common than right)	Pedunculated, narrow stalk, mobile; heterogeneous

Infectious vegetation could be either bacterial or fungal. *Candida* endocarditis in neonates usually involves the right atrium. Patients are usually ill; 90% are associated with a central venous catheter. Decrease in size has been reported after 10 days and resolution after

3 months on combination antifungal therapy.[3] The clinical condition and absence of infectious markers in our patient would exclude an infectious cause.

Given the full resolution of the mass in 5.7 days, the mass in our patient was most likely to have been a TE as opposed to a tumour. Measurement of D-dimers was not performed at the time, but this may have been useful not only to assist with the diagnosis but also to monitor the resolution.

In newborns, TE may be associated with indwelling central lines, systemic septicaemia, asphyxia, dehydration, congenital heart disease, and maternal diabetes, but may also include a group with no identified risk factors.[8] Infection itself has been identified as an association in neonatal venous thromboembolism (VT);[9] our patient had a clinically suspected infection with confirmed histopathological chorioamnionitis.

Although thrombolysis has been shown to be safe in small case study reports,[10] Monagle *et al.* suggest thrombolytic therapy in neonates only if there is major vessel occlusion.[11] A prospective study evaluating the management of catheter-related TE suggested three different treatment options: thrombolysis, heparinization, or a 'wait and watch' approach. Overall, 65 of the cohort (23 with atrial TE) were managed as 'wait and watch'. For the overall cohort, 83% had resolved or improved on a scan done at median 49 days.[12,13]

An embolus originating from the right atrium would usually result in a pulmonary embolus (PE). A large proportion of neonates and children with PE are asymptomatic, the typical clinical signs only evident if the PE is severe.[14] The POCUS at 5.7 days showed normal biventricular size and contractility; all the valves and the large vessels were clear of any masses.

There is currently a lack of clear and up-to-date evidence-based guidelines regarding ideal management of a neonate with TE. A large international thrombosis network study[15] is currently underway and may answer questions such as the natural history of asymptomatic VT and right atrial TE in children, the benefits of anticoagulation vs. no anticoagulation in neonates with asymptomatic TE, and when thrombolysis and/or thrombectomy may be indicated, as well as the outcomes of these interventions.

In this case, POCUS proved to be a useful tool in the identification and follow-up of an intracardiac mass in a preterm infant. The spontaneous resolution within 6 days was unexpected.

Lead author biography

Dr Jan Klimek received his neonatal ultrasound training from the late Dr Rex Betheras and then at the Royal Women's Hospital, Melbourne. Further experience and education was obtained through interaction with Dr Jonathan Skinner and the Auckland Paed Cardiology team, now receiving support from the Paed Cardiology team at the Children's Hospital at Westmead, Sydney.

Supplementary material

Supplementary material is available at *European Heart Journal – Case Reports*.

Consent: Signed consent has been obtained from the mother in accordance with the Committee on Publication Ethics (COPE) guidelines.

Conflict of interest: None declared.

Funding: Ultrasound scans performed were part of the standard clinical care; no additional funding was required for this case report.

Data availability

The data underlying this article are available in the article and in its online Supplementary material.

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