

# Respiratory failure caused by cardiac dysfunction triggered by bronchiolitis

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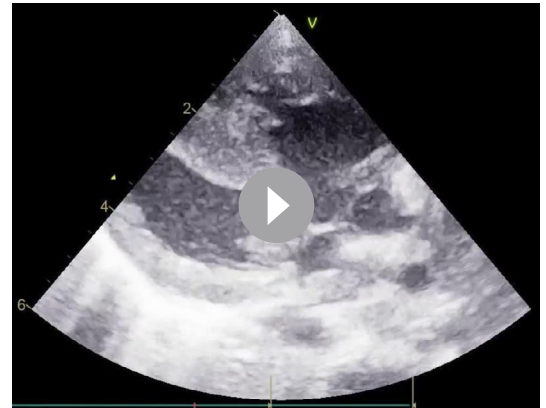
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A 3-month-old female weighing 3.6 kg, with trisomy 21, who had undergone pulmonary artery banding for atrioventricular septal defect 2.5 months prior to the presentation was referred to our hospital because of nasal discharge and cough for 3 days and wheezing and decreased feeding for 1 day before admission. On arrival, her vital signs were respiratory rate, 60 breaths/min; oxygen saturation, 90% (oxygen mask 5 L/minute); heart rate, 138 beats/min and axillary temperature, 36.5°C. Physical examination revealed subcostal retraction, prolonged expiration, diminished breath sounds, expiratory wheezing on bilateral lungs, grade III/VI pan-systolic murmur, hepatomegaly, livedo reticularis and cold extremities. According to multiplex PCR, she was positive for respiratory syncytial virus (RSV). On chest X-ray, extensive infiltrative shadows were observed in the left lung field. Although she has not been diagnosed as asthma, salbutamol inhalation was administered as diagnostic intervention for acute exacerbation of it; however, it did not improve respiratory distress. We suspected respiratory failure caused by bronchiolitis and compensated shock secondary to poor oral intake; thus, she was admitted to the intensive care unit.

Thereafter, point-of-care echocardiography revealed diffuse hypokinesis, and the left ventricular ejection fraction was 33.1% (video 1). The brain natriuretic peptide level was 9791 pg/mL. Despite receiving endotracheal intubation and mechanical ventilation, oxygenation deteriorated; oxygen saturation was 70% with fraction of inspiratory oxygen of 1.0 and positive end-expiratory pressure of 14 cmH<sub>2</sub>O. We suspected acute exacerbation of heart failure and pulmonary hypertension. Therefore, dobutamine, diuretics and nitric oxide inhalation were initiated. Consequently, oxygenation



**Video 2** Point-of-care echocardiography reveals a left ventricular ejection fraction of 69.1% on day 4 after admission.

gradually improved with oxygen saturation of 94% after nitric oxide inhalation, and the cardiac function also improved on the following day (video 2). She was extubated after 10 days and discharged 31 days after admission.

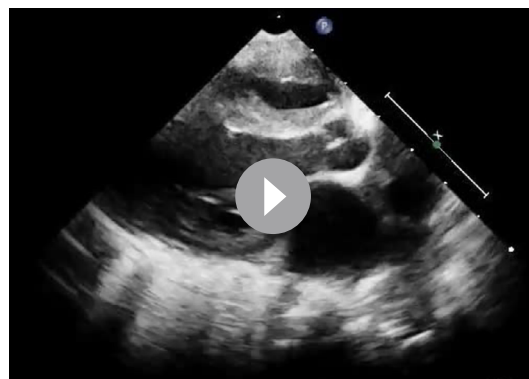
In this case, respiratory failure was caused by cardiac dysfunction triggered by RSV infection. RSV infection can lead to severe illness in infants with congenital heart disease.<sup>1</sup> With infection, cardiac function may deteriorate in children with congenital heart disease.<sup>2</sup> Therefore, point-of-care echocardiography should be performed in patients suffering from respiratory distress or respiratory tract infection with an identified pathogenic microorganism, especially if they have a history of heart disease.

## Patient's perspective

The patient's mother said 'when she was admitted to the hospital, I only wanted her to survive.'

## Learning points

- ▶ Point-of-care echocardiography should be performed in children with respiratory distress or respiratory tract infection with an identified pathogenic microorganism, especially if they have a history of cardiac disease.
- ▶ Respiratory syncytial virus infection can lead to severe illness in infants with congenital heart disease.



**Video 1** Point-of-care echocardiography reveals a left ventricular ejection fraction of 33.1% on admission.



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We assumed that the left ventricular systolic dysfunction of this patient was induced by afterload elevation caused by agitation from dyspnoea, hypovolaemia secondary to poor oral intake, and infection. Considering the presence of cardiac dysfunction and infection, myocarditis is an important differential diagnosis in this case. Improvement of myocarditis takes weeks.<sup>3</sup> However, in this case, cardiac function improved the next day after admission. Thus, myocarditis was less likely.

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