

# Cannon wave “equivalent” – a clinical sign observed during echocardiography

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A 59-year-old man with severe mitral regurgitation underwent successful mitral valve repair. Post-operative recovery was uneventful except for the development of a third-degree atrio-ventricular block (fig. 1A). The haemodynamic consequences of the atrio-ventricular dissociation were observed during echocardiography (fig. 1B and 1C): at the beginning and the end of the recordings, right atrial depolarisation and contraction occurs during ventricular systole when the tricuspid valve is closed, leading to reversal of blood flow (short

arrows). This echocardiographic finding represents the clinically observable jugular venous pulsation called “Cannon waves”. In contrast, when the atrio-ventricular sequence is more or less correct, the backflow into the IVC and the HV is minimal (long arrows).

The differential diagnosis of systolic flow reversal includes tricuspid regurgitation (excluded in fig. 1D, dashed circle) as well as rhythm disorders (atrial or ventricular premature beats, atrioventricular block of any degree and atrioventricular dissociation during ventricular tachycardia).

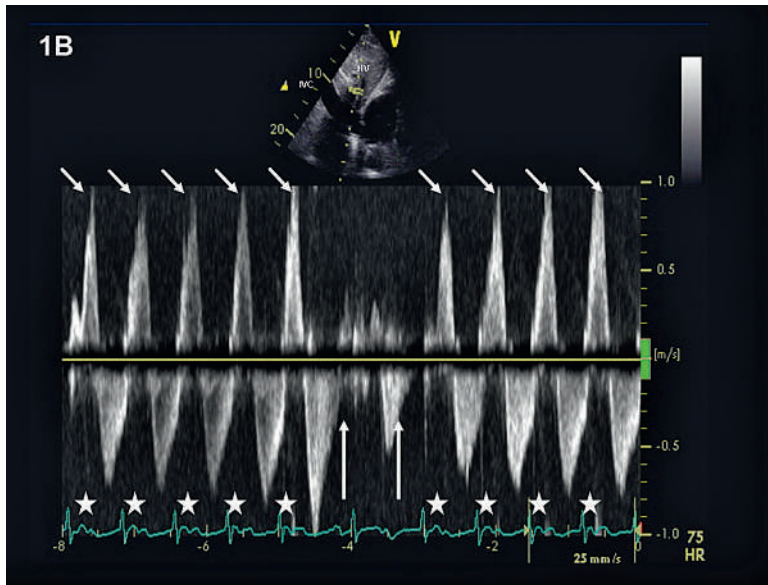
**Figure 1A**  
Third-degree atrio-ventricular block.



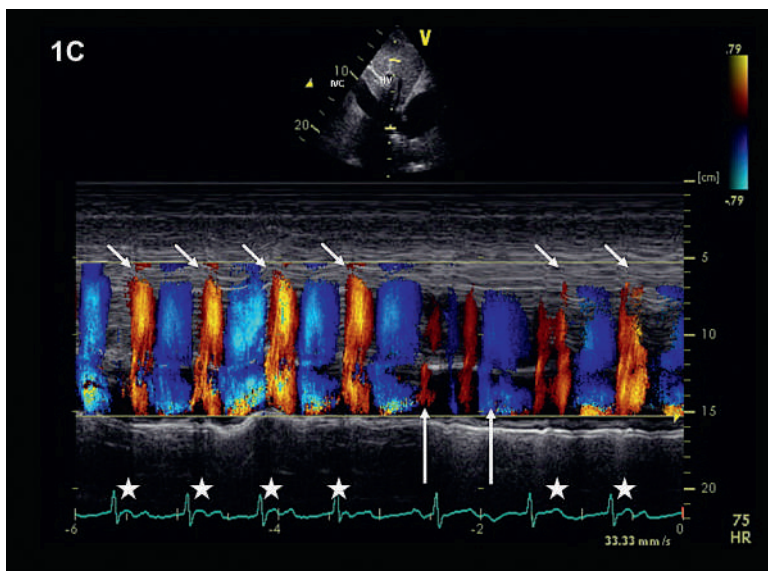
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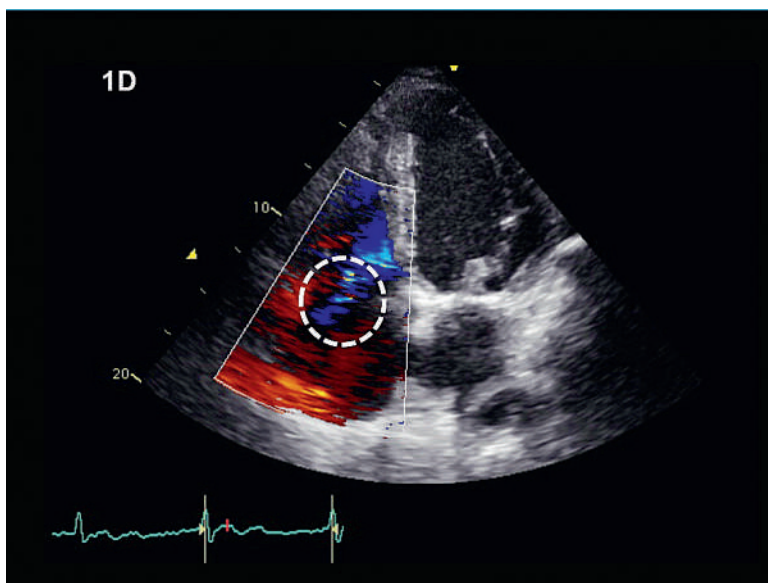
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**Figure 1B**

Pulse-wave Doppler through a hepatic vein demonstrating blood flow reversals during atrioventricular block. If atrioventricular sequence is correct (arrows), backflow into the hepatic vein is minimal.

**Figure 1C**

Colour-Doppler M-mode through a hepatic vein confirming the findings from figure 1B.

**Figure 1D**

Colour-Doppler image. Relevant tricuspid regurgitation can be excluded.