

Diastolic Mitral Regurgitation in Complete Heart Block

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A 71-year-old woman presented with generalized weakness and lightheadedness that she had experienced during the prior 24 hours. She reported no chest pain, dyspnea, recent tick bites, rashes, or febrile illnesses. Her blood pressure was 132/47 mmHg, and her pulse rate was 38 beats/min. The remainder of her physical examination revealed nothing of note. Results of routine laboratory tests were normal. Her 12-lead electrocardiogram showed sinus rhythm with 3rd-degree atrioventricular (AV) block, also known as complete heart block (Fig. 1). The patient was admitted to the intensive care unit. Serologic results were negative for Lyme disease. A transthoracic echocardiogram showed moderate diastolic mitral regurgitation (MR) and trace systolic MR in color-flow (Fig. 2A) and continuous-wave spectral Doppler modes (Fig. 2B). The patient underwent implantation of a dual-chamber pacemaker, after which an electrocardiogram showed an atrial-sensed, ventricular-paced rhythm (Fig. 3). A repeat transthoracic echocardiogram showed resolution of her diastolic MR (Fig. 4A) and no significant MR during systole (Fig. 4B). The patient's symptoms resolved, and she was discharged from the hospital.

Comment

Mitral regurgitation, either primary or secondary, usually occurs during systole when left ventricular (LV) pressure increases and the mitral valve is closed. Although it is generally an uncommon finding, diastolic MR can occur during AV dissociation, and it is usually mild and clinically insignificant. In patients with sinus rhythm and AV block, prolongation of the PR interval can result in a reverse pressure gradient between the LV and left atrium, leading to early partial closure of the mitral valve in diastole. Subsequent atrial contraction after a nonconducted P wave without ventricular systole leaves the mitral valve open, resulting in regurgitation during diastole.^{1,2} Diastolic tricuspid regurgitation can also happen in this situation.³ Diastolic MR in the absence of AV block might also occur in patients with substantially elevated LV end-diastolic filling pressures and restrictive physiology or severe acute aortic regurgitation.⁴ Other conditions in which diastolic MR can occur include atrial tachyarrhythmia, such as atrial flutter with AV block, and dilated cardiomyopathy resulting in tethering of the mitral valve leaflets.⁵ Cardiac resynchronization therapy, when used in selected patients with advanced systolic heart failure and QRS prolongation, has been shown to eliminate diastolic MR by increasing the transmitral closing forces and shortening the AV delay.⁶

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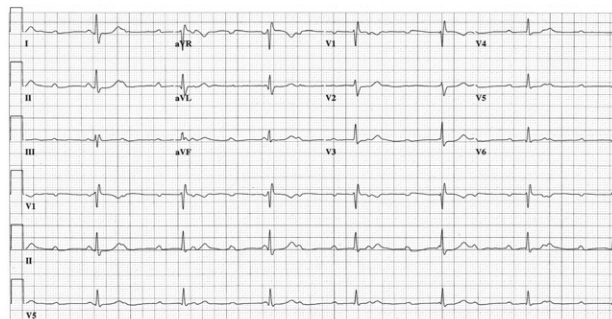


Fig. 1 Twelve-lead electrocardiogram shows sinus rhythm with 3rd-degree atrioventricular block.

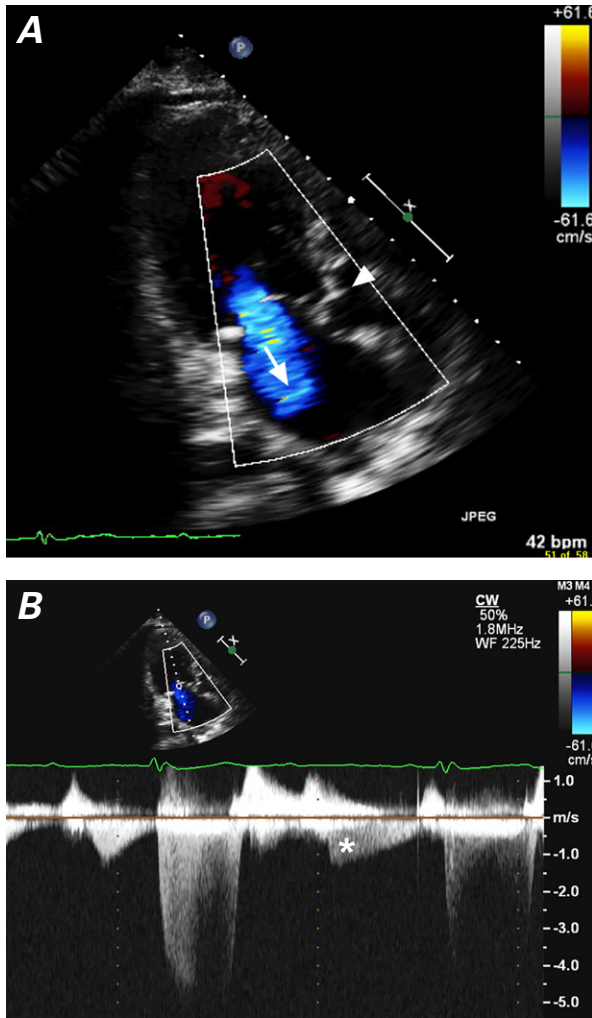


Fig. 2 Transthoracic echocardiograms (apical 3-chamber view) in **A**) color-flow and **B**) continuous-wave spectral Doppler modes show moderate diastolic regurgitation (arrow in A, asterisk in B) and a closed aortic valve (arrowhead in A).

Supplemental motion image is available for [Figure 2A](#).

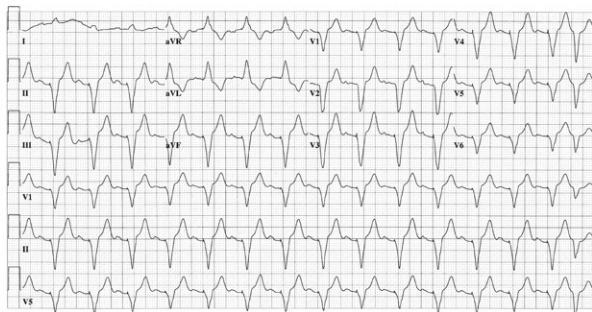


Fig. 3 After dual-chamber pacemaker implantation, a 12-lead electrocardiogram shows an atrial-sensed, ventricular-paced rhythm.

It is conceivable that, in patients such as ours who have high-grade AV block, moderate diastolic MR con-

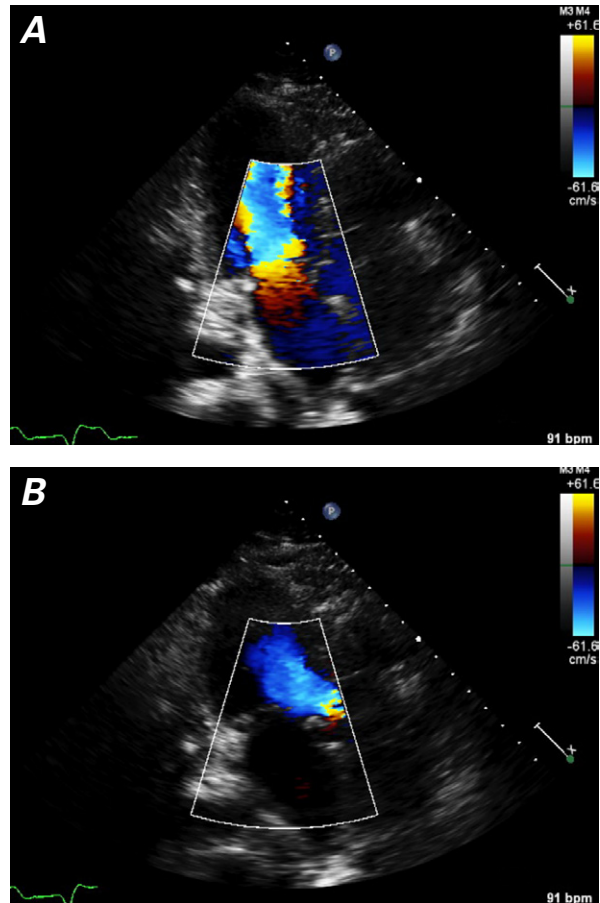


Fig. 4 A repeat transthoracic echocardiogram (color-flow Doppler mode) shows normal diastolic inflow across the mitral valve and no significant mitral regurgitation in **A**) diastole or **B**) systole.

Supplemental motion image is available for [Figure 4](#).

tributes to the symptoms associated with the condition. Restoring AV synchrony with dual-chamber pacing eliminates diastolic MR in these cases. Echocardiography with color Doppler is the most useful imaging method for identifying diastolic MR in patients with AV block because it enables visualization of the direction, velocity, and timing of regurgitant blood flow.

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