A 48-year-old man with relapsed multiple myeloma developed peripheral neuropathy after a second autologous stem-cell transplantation and was referred to the UK National Amyloidosis Centre for evaluation of possible amyloidosis. There was no history to suggest cardiovascular involvement; specifically, there was no history of breathlessness or syncopal episodes, although the patient had developed atrial fibrillation during the third week after stem-cell transplantation. The patient’s treatment included amiodarone but not digoxin. He had developed myeloma-related renal failure and had been receiving dialysis for 6 months. On arrival in the echocardiography suite, his blood pressure was 152/39 mm Hg in a sitting position and he had a regular peripheral pulse of 40 beats per minute. ECG showed atrial flutter at a rate of 328 per minute in association with a QRS rate of 123 per minute—a ratio of 8 flutter waves to 3 QRS complexes (Figure 1). The relationship between the flutter waves and the QRS complexes was that odd-number flutter waves were blocked, whereas even-number flutter waves were conducted with second-degree atrioventricular block type 1 (Wenckebach).

An unusual cause of the peripheral pulse deficit was apparent on echocardiography. There were no structural valvular abnormalities, but there was a mild concentric increase in left ventricular wall thickness and globally impaired left ventricular systolic function. The mitral valve opened during every diastolic phase, and although the ventricle contracted with each QRS complex (Figure 2), the aortic valve opened only after every third QRS complex after a longer RR interval (Figure 3). This probably occurred as the combined result of impaired left ventricular systolic function and insufficient preload at the faster RR interval and in association with a relatively high afterload.

In retrospect, auscultation of the heart revealed the informative cyclic pattern of S1, S1, S1-S2—that is, 3 solitary first heart sounds and then a second heart sound. The S1 rate was concordant with the apex beat on palpation and the QRS rate on ECG, whereas the S2 rate was concordant with the peripheral pulse rate.

**Disclosures**

None.

**Reference**

Figure 1. ECG showing atrial flutter with an almost regular pattern of 3 QRS complexes at an interval of 0.4 s, with an interval of 0.68 s between them.

Figure 2. M-mode ECG of the left ventricle at mitral level. The left ventricle can be seen contracting at every QRS complex, and the mitral valve is seen to open at every diastolic phase.

Figure 3. M-mode ECG across the aortic valve, which opens only every third QRS complex after a longer RR interval.