A 70-year-old woman with heart failure with preserved ejection fraction

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A 70-year-old woman was referred to her family physician by the emergency department for follow-up of shortness of breath, orthopnea and swelling of her legs that she had experienced for two months. She had no other symptoms and was taking amlodipine 10 mg daily and lisinopril 10 mg daily for hypertension. On physical examination, her blood pressure was 160/92 mm Hg and pulse rate was 70 beats/min. Estimated central venous pressure was 12 (normal ≤ 8) cm H₂O. Cardiac examination was unremarkable, and there were bibasilar crackles on lung auscultation. She had bilateral pedal pitting edema. In the emergency department, test results for electrolyte levels and renal function were within normal limits. An electrocardiogram showed sinus rhythm and left ventricular hypertrophy. An echocardiogram showed an ejection fraction of 56%, concentric left ventricular hypertrophy with no substantial valvular abnormalities, and grade III diastolic dysfunction.

What is the diagnosis?

Based on the presenting symptoms and examination findings, the clinical syndrome of heart failure was diagnosed. Heart failure is a clinical diagnosis. Once the diagnosis is made, ejection fraction measured by echocardiography helps to distinguish between different types of heart failure (Box 1).

Diagnosis of heart failure with preserved ejection fraction is challenging, because other potential causes of symptoms have to be excluded. Most patients with heart failure with preserved ejection fraction have evidence of abnormal left ventricular diastolic function on Doppler echocardiography.¹ ² In the past, heart failure with preserved ejection fraction was commonly called “diastolic heart failure.” Because left ventricular diastolic dysfunction is seen not only in patients with heart failure with preserved ejection fraction, but also in those with heart failure with reduced ejection fraction, “heart failure with preserved ejection fraction” has replaced “diastolic heart failure.”¹ ³ About 40%–70% of patients with clinical heart failure have heart failure with preserved ejection fraction.¹ Among the patients admitted to hospital with decompensated heart failure, the proportion of those with heart failure with preserved ejection fraction has been increasing over the last 15 years.⁴ ⁵

Heart failure with preserved ejection fraction and heart failure with reduced ejection fraction are two distinct syndromes and do not represent a continuous spectrum of disorder. They differ in several aspects, including pathophysiology, patient population and treatment modalities.¹ ² Pathophysiology of heart failure with preserved ejection fraction is related to diastolic dysfunction, and major predictors are left ventricular relaxation and stiffness.² ³

Our patient had clinical features of heart failure but had normal left ventricular ejection fraction, and therefore was given the diagnosis of heart failure with preserved ejection fraction.

What risk factors may have contributed to heart failure in this patient?

The major predictors of heart failure with preserved ejection fraction are hypertension, atrial fibrillation, older age, female sex, coronary artery disease, obesity, diabetes and hyperlipidemia.¹ Of these risk factors, hypertension is the most

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**Box 1: Types of heart failure based on left ventricular ejection fraction**¹

| Ejection fraction, % | Diagnosis in patients with clinical heart failure |
|----------------------|--------------------------------------------------|
| ≥ 50                 | Heart failure with preserved ejection fraction   |
| 41–49                | Heart failure with borderline preserved ejection fraction |
| ≤ 40                 | Heart failure with reduced ejection fraction     |
frequent, with prevalence of up to 90%. Also, heart failure with preserved ejection fraction is associated with multiple noncardiac comorbidities, such as chronic kidney disease, lung disease, anemia, liver disease and thyroid diseases.

Our patient had a history of long-standing hypertension, which likely contributed to the development of heart failure with preserved ejection fraction.

What follow-up does this patient require?

Patients with heart failure with preserved ejection fraction should receive follow-up like those with heart failure with reduced ejection fraction. Although mortality for heart failure with preserved ejection fraction may be lower than that for heart failure with reduced ejection fraction, studies show that the rate of heart failure–related hospital admissions among patients with heart failure with preserved ejection fraction is similar to the rate among patients with heart failure with reduced ejection fraction. An efficient system of coordinated care, active patient education and appropriate follow-up is recommended for all patients with heart failure with preserved ejection fraction.

Case revisited

The patient was advised to increase her lisinopril dose to achieve better blood pressure control, and she was also started on spironolactone. At two weeks’ follow-up, her shortness of breath was better and her blood pressure was 138/82 mm Hg. She was referred to a heart failure clinic for follow-up.

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