Diagnosis of Heart Failure with Preserved Ejection Fraction

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KEYWORDS

• Heart failure with preserved ejection fraction • Diastolic heart failure • Diagnosis • Biomarkers • Echocardiographic • Diastolic dysfunction

KEY POINTS

- Heart failure with preserved ejection fraction (HFpEF) is characterized by typical signs and symptoms of heart failure, a preserved left ventricular ejection fraction, and functional and/or structural alterations of left ventricular function.
- Comorbidities (eg, chronic obstructive pulmonary disease, renal insufficiency) are frequent and may cause similar symptoms as HFpEF, and therefore must be addressed in the differential diagnosis.
- Different clinical settings for HFpEF are discussed.

INTRODUCTION

Nature of the Problem

Heart failure is the leading cause of hospitalization in the Western world, and heart failure with preserved ejection fraction (HFpEF) is now considered the major phenotype of heart failure within an aging population.[1]

Heart failure with preserved ejection fraction is often also referred to as *diastolic heart failure*, because abnormalities of diastolic dysfunction are common. However, diastolic dysfunction is also highly prevalent in patients with cardiovascular risk factors but without heart failure symptoms, and in patients with heart failure and reduced ejection fraction. Hence, the more descriptive phrase *heart failure with preserved ejection fraction* is now the commonly accepted term used in scientific literature.

Heart failure with preserved ejection fraction was probably first described as early as 1985 by Topol and colleagues.[2] These investigators described 21 cases of elderly, predominantly female, and predominantly black patients with hypertrophied left ventricles and heart failure symptoms in the absence of severe coronary artery disease and with a very high left ventricular ejection fraction, but abnormal diastolic function.

These findings have fostered research at a basic science level, in patient-oriented research, and in population-based cohorts. Most of the early findings by Topol and colleagues[2] have been confirmed, and this review focuses on the current understanding of modalities to diagnose HFpEF and to distinguish the impact of comorbidities, which play an important role in the disease.

Diagnosing HFpEF: What Do the Guidelines Say?

Diagnosing HFpEF is often more challenging than diagnosing heart failure with reduced ejection fraction (HFrEF) (ie, systolic heart failure). With HFrEF, the presence of systolic dysfunction (especially

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through assessing the left ventricular ejection fraction) has been widely accepted as the key objective diagnostic criterion. In the former, recent European and American guidelines address the diagnostic challenges, and various algorithms for the diagnosis of HFpEF have been proposed.[3] To date there is still no uniformly accepted consensus on a diagnostic approach or specific cutoffs for diagnostic criteria, and adequately powered trials to validate different diagnostic approaches are lacking. Moreover, different pathophysiologies may underlie different diseases that all manifest as heart failure, and hence HFpEF may be the end of the line of different diseases but with a similar clinical picture that makes the (differential) diagnosis even more difficult.

The definitions of heart failure used in the 2012 European Society of Cardiology (ESC) Guidelines for the diagnosis and treatment of acute and chronic heart failure[4] and the 2013 American College of Cardiology Foundation/American Heart Association (ACCF/AHA)[5] Guideline for the management of heart failure are summarized in **Table 1**.[6] A consensus document by the Heart Failure and Echocardiography Associations of the European Society of Cardiology[3] also exists, which differs slightly from the ESC guidelines in that it includes specific definitions for invasively measured alterations in relaxation and filling pressures (eg, elevated left ventricular end diastolic pressure, left ventricular stiffness) and different cutoffs for natriuretic peptides. Specific clinical factors that increase the likelihood of diagnosis of HFpEF should also be taken into consideration, such as the presence of atrial fibrillation and female sex, whereas coronary artery disease, ST elevation, and left bundle branch block favor HFrEF.[7]

Symptom Criteria

In the European Guideline, the diagnosis of heart failure requires the presence of signs and symptoms of heart failure.[4] Typical signs and symptoms are displayed in **Table 2**. The specificity of different clinical signs for heart failure may be difficult, and possible other causal diagnoses must be considered. Typical symptoms of heart failure include breathlessness, orthopnea, paroxysmal nocturnal dyspnea, reduced exercise tolerance, and fatigue.

CLINICAL FINDINGS

Physical Examination

Clinical findings in HFpEF do not substantially differ from those in HFrEF. Specific findings during physical examination are elevated jugular venous pressure, hepatojugular reflux, third heart sound, laterally displaced apical impulse, and cardiac murmur. Peripheral edema, especially at the ankles, is common and pulmonary crepitations are often heard, especially if the onset of symptoms is acute. Physical examination should also focus on common comorbidities (eg, anemia, chronic

Table 1
Comparison of recent European and American Guidelines regarding the definition and classification of heart failure

	2012 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure	2013 ACCF/AHA Guideline for the Management of Heart Failure
HF definition	Abnormality of cardiac structure or function leading to failure of the heart to deliver oxygen at a rate commensurate with the requirement of the metabolizing tissues, despite normal filling pressure (or only at the expense of increased filling pressures)	Complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood
HF-PEF diagnosis	Requires 4 conditions to be satisfied • Typical symptoms of HF • Typical signs of HF • Preserved ejection fraction (EF ≥45%) and left ventricle not dilated • Relevant structural heart disease and/or diastolic dysfunction	Stage C heart failure • Known structural heart disease • Typical signs and symptoms • Preserved ejection fraction (EF ≥50% → HF-PEF, EF 41%–50% → borderline HF-PEF)

Abbreviations: EF, ejection fraction; HF, heart failure; PEF, preserved ejection fraction.
Adapted from Rigolli M, Whalley GA. Heart failure with preserved ejection fraction. J Geriatr Cardiol 2013;10:369–76.