DISCUSSION OF CASE THREE

The E to A ratio as measured on echocardiography can be used to help assess the presence of and severity of diastolic dysfunction. The E velocity reflects the speed of blood flow from the left atrium through the mitral valve into the left ventricle during early diastole. The E velocity mainly reflects the pressure difference (pressure gradient) between the left atrium and left ventricle and is influenced by left atrial pressure, left ventricular compliance, and the rate of left ventricular relaxation.

The A velocity reflects the speed of blood flow across the mitral valve late in diastole, is reflective of left atrial contraction, and is determined mainly by left atrial contractility and left ventricular compliance.

Normally the velocity of flow across the mitral valve is higher in early diastole than late diastole, and thus the E velocity is higher than the A velocity, with the E/A ratio normally from about 0.9 to about 1.5 or so. With aging, the E velocity tends to decrease and the A velocity tends to increase.

Diastolic dysfunction can be divided into stages. The first stage is referred to as impaired relaxation or abnormal relaxation, and may be associated with aging, hypertension, coronary artery disease, and left ventricular hypertrophy. In this stage, abnormal relaxation of the left ventricle results in a compensatory increase in left atrial contractility rather than increased left atrial pressure/increased pressure gradient between the left atrium and the left ventricle, and the E/A ratio is less than about 0.9 with A greater than E.

In the next stage of diastolic dysfunction, decreased left ventricular compliance results in a compensatory increase in left atrial pressure in order to maintain left ventricular filling, and this increases the pressure gradient between the left atrium and left ventricle, increasing E and thus the E/A ratio is once again from about 0.9 to about 1.5, in what is referred to as pseudonormalization, since the E/A ratio is the same as in normal people.

As diastolic dysfunction worsens, left ventricular compliance continues to decrease, left atrial pressure continues to increase, the pressure gradient between the left atrium and left ventricle continues to increase, and E continues to increase, and the E/A ratio can become about 2.0 or higher. Advanced stages of diastolic dysfunction are referred to as restriction.

Left atrial enlargement in the face of diastolic dysfunction suggests an increased risk for an adverse outcome.

Diastolic heart failure refers to those who have the clinical syndrome of heart failure with a normal ejection fraction, while diastolic dysfunction refers to diastolic function abnormalities of the left ventricle without reference to the clinical status.

Although commonly assessed based upon left ventricular wall thickness, left ventricular hypertrophy is actually defined as an increase in left ventricular mass, and is more accurately assessed using the left ventricular mass index, which uses a formula relating left ventricular size and posterior wall and septal thickness, and corrects for build. An increased left ventricular mass index is associated with increased mortality risk.
According to the American Society of Echocardiography, the normal reference range for left ventricular mass index for women is 43-95 g/m², mildly abnormal is 96-108 g/m², moderately abnormal is 109-121 g/m², and severely abnormal is at least 122 g/m².

For men the normal reference range is 49-115 g/m², mildly abnormal is 116-131 g/m², moderately abnormal is 132-148 g/m², and severely abnormal is at least 149 g/m².

The applicants left ventricular mass index is about 130 g/m², which falls into the mildly abnormal range.

An article published in 2009 in the American Heart Journal (see references) noted that while asymptomatic people with left ventricular hypertrophy overall had higher BNP and NT-proBNP levels, there was considerable overlap with those who did not have hypertrophy, and thus the natriuretic peptide levels could not accurately differentiate the two groups.

Overall risk assessment: mild extra risk

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