Differentiate Between Systolic and Diastolic Heart Failure

Student’s Name:

Institution:

Course:

Instructor:

Date:

**Differentiate Between Systolic and Diastolic Heart Failure**

Systolic heart failure is when the left ventricular (LV) is unable to contract effectively, resulting in a diminished ejection fraction (HFrEF) (EF ≤ 40%) (Schwinger, 2021). The common causes of systolic heart failure include myocardial infarction, dilated cardiomyopathy, and valvular heart disease. Clinically, it is associated with significant cardiomegaly, or an enlarged heart (Heuschmann et al., 2021). Early diagnosis of systolic dysfunction involves assessing global ejection fraction and regional wall motion abnormalities. In contrast, diastolic heart failure consists of the heart's inability to relax and fill properly during diastole despite a normal or nearly normal ejection fraction (HFpEF) (EF ≥ 50%) (Schwinger, 2021). This condition is marked by increased resistance to ventricular filling and elevated filling pressures, often without significant enlargement of the LV chamber (Schwinger, 2021). Conditions such as hypertension, hypertrophic cardiomyopathy, and aortic stenosis commonly lead to diastolic dysfunction.

**Patient - Diastolic Heart Failure**

The patient is in systolic heart failure (HFrEF) since the echocardiogram findings show an ejection fraction of 25%, which is below the normal range (55-70%). The echocardiogram also revealed decreased wall motion of the anterior wall of the heart, suggesting impaired contractility (Schwinger, 2021). These findings, combined with the clinical presentation of symptoms such as shortness of breath, fatigue, orthopnea (requiring multiple pillows to sleep), and signs like a 3rd heart sound and jugular venous distention, are consistent with systolic dysfunction (Halabi et al., 2023). The patient's history of hypertension, hyperlipidemia, and Type 2 diabetes further supports this diagnosis, as these conditions are common risk factors for myocardial infarction and subsequent systolic heart failure.

**Pathophysiology**

The pathophysiology of dyspnea on exertion in systolic heart failure starts with the heart's reduced ejection fraction, leading to decreased cardiac output (Schwinger, 2021). This inadequacy in forward blood flow causes a backup of blood in the pulmonary veins, increasing pulmonary capillary pressure. As a result, fluid leaks into the pulmonary interstitium and alveoli, causing pulmonary congestion. Pitting edema in heart failure arises from elevated venous pressure since the heart cannot effectively pump blood (Halabi et al., 2023). This increased pressure is transmitted to the capillaries, resulting in fluid leakage into the surrounding tissues. The accumulation of this fluid, particularly in dependent areas such as the legs and ankles, manifests as pitting edema.

Moreover, Jugular vein distention occurs due to elevated right atrial pressure due to the backup of blood into the systemic venous circulation (Schwinger, 2021). The jugular veins, which drain into the right atrium, become engorged and distended due to the increased central venous pressure. Orthopnea occurs in heart failure because of increased venous return to the heart from the lower extremities and abdominal organs (Schwinger, 2021). The compromised left ventricle cannot handle this increased preload, leading to further pulmonary congestion. This symptom is a hallmark of advanced heart failure and indicates significant cardiac dysfunction.

**3rd Heart Sound and Ejection Fraction of 25%**

The presence of a third heart sound (S3) and an ejection fraction (EF) of 25% in this patient indicates severe systolic heart failure. The S3 sound occurs early in diastole during the rapid filling phase of the ventricle (Halabi et al., 2023). This sound is associated with increased left ventricular end-diastolic pressure and correlates with increased ventricular volume. S3 also suggests that the ventricle is overfilled and stretched, consistent with the dilated ventricle found in advanced stages of systolic heart failure.  On the other hand, an ejection fraction of 25% signifies severe systolic dysfunction, as it is below the normal range of 55-70% (Schwinger, 2021). This reduced EF indicates the heart's significantly diminished ability to contract and pump blood effectively, leading to impaired cardiac output. Consequently, the patient experiences shortness of breath, fatigue, and edema, as the heart cannot meet the body's metabolic demands.

**References**

El Halabi, J., Hariri, E., Pack, Q. R., Guo, N., Yu, P. C., Patel, N. G., ... & Rothberg, M. B. (2023). Differential impact of systolic and diastolic heart failure on in-hospital treatment, outcomes, and cost of patients admitted for pneumonia. *American journal of medicine open*, *9*, 100025. <https://doi.org/10.1016/j.ajmo.2022.100025>

Heuschmann, P. U., Montellano, F. A., Ungethüm, K., Rücker, V., Wiedmann, S., Mackenrodt, D., ... & Kleinschnitz, C. (2021). Prevalence and determinants of systolic and diastolic cardiac dysfunction and heart failure in acute ischemic stroke patients: the SICFAIL study. *ESC heart failure*, *8*(2), 1117-1129. <https://doi.org/10.1002/ehf2.13145>

Schwinger, R. H. (2021). Pathophysiology of heart failure. *Cardiovascular diagnosis and therapy*, *11*(1), 263. <https://doi.org/10.21037%2Fcdt-20-302>