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Evaluation of Right Ventricular Function in Heart Failure Patients with Preserved Ejection Fraction using 2D Speckle Tracking Echocardiography

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Abstract

History Heart failure with preserved ejection fraction (HFpEF) is a term used to describe patients who show symptoms of HF but have a normal or nearly normal left ventricular ejection fraction (LVEF). The purpose of this research was to examine the use of 2D-STE for the detection of right ventricular dysfunction in patients with heart failure who showed no sign of ejection fraction reduction. Topics and approaches: Both Benha University and the Benha Teaching Hospitals participated in the study's research. two hundred people participated, all of whom were split evenly between two groups: group I included 100 people who had been diagnosed with HFpEF, while group II included the other 100 people. Fifty healthy people of the same age and gender were matched up with the patients who served as the control group. Right ventricular diameter (RVD; mid, basal, longitudinal), Tricuspid annular plane systolic excursion (TAPSE; P = 0.473), and right ventricular fractional area change (RVFAC; P = 0.12) were not significantly different between the two groups. Patients with HFpEF who have characteristics detectable by 2D speckle tracking echocardiography have an increased likelihood of a poor prognosis, according to the study's authors. When compared to the findings of standard 2D echocardiography, this is a major difference. ConclusionsThese findings provide support to the concept that RV 2D-STE might be utilised to accurately diagnose people with HFpEF .

Key words: Heart failure with maintained function, Right ventricular function, Doppler echocardiography in 2 dimensions.

1. Introduction

Patients with heart failure with preserved ejection fraction (HFpEF) have symptoms of heart failure (HF) owing to elevated left ventricular (LV) filling pressure, but no treatment has been shown to reduce morbidity and death in this population. As a result [1], HFpEF is either the most prevalent form of HF at now or is expected to become the most prevalent form of HF in various parts of the world. [2] By making analogies between current mechanistic knowledge and potential treatments, this study aims to give a translational perspective on recent achievements in HFpEF. Heart failure with reduced ejection fraction (HFrEF) is also characterised by a broad range of etiologies (including myocardial infarction and valve disease) and is resistant to improvement due to systemic neuroendocrine activation, as has been noted in a number of recent articles. Evidence is growing that systemic microvascular inflammation may play a role in sustaining HFpEF, which might have a broad range of causes (including, but not limited to, hypertension and diabetes). Treatment of symptoms and etiologies in heart failure with preserved ejection fraction as it currently exists While diuretics are often prescribed to people with heart failure with preserved ejection fraction (HFpEF) for congestion relief, there is less data to back their utility. Research on rate regulation in patients with atrial fibrillation, a frequent complication of HFpEF, is similarly hampered. People with HFpEF with atrial fibrillation may benefit from rhythm treatment, however the data is mixed. Substantial indirect evidence suggests that medication of hypertension may be effective in avoiding HFpEF, even if the results are less apparent for reducing morbidity or mortality in persons with existing HFpEF. It has been shown that patients in the SPRINT trial [4] and the HYVET study [5] who aggressively lowered their blood pressure had fewer HF hospitalizations than those who did not.

Patients with established HFpEF have steep end-systolic pressure-volume correlations, hence lowering blood pressure in these patients should be done with caution.

Is a haemodynamic disorder comparable to HFrEF in which the heart either cannot satisfy the body's circulatory demands or does so at the expense of high left ventricular filling pressures. We propose that in HFpEF patients with congestion, the underlying haemodynamic processes of increased left ventricular end-diastolic pressure, left atrial hypertension, pulmonary venous congestion, and plasma volume expansion should be considered as possible first-line targets for therapy (Figure 1). Because of this, we have divided our research into six potential avenues for treating HFpEF (Figures 2 and 3): Three distinct hemodynamic processes left heart [6]

Finaly, in a substudy of the Chronic Offers Management to Patients with Advanced Signs and Symptoms of Heart Failure (COMPASS-HF) trial involving 70 patients with HFpEF, an increase in invasively measured estimated pulmonary artery diastolic pressure (reflecting left atrial pressure and left ventricular filling pressure) was associated with transition from chronic compensated to acute decompensated HF [8]. (9) We conclude that increased left ventricular diastolic pressures and the consequent left atrial hypertension play a crucial role in the genesis of HFpEF. Therapy Reduced left atrial pressure during exercise using a transcatheter interatrial shunt device (IASD, Corvia Medical, Tewkesbury, MA, USA) improved 6-minute walk distance and exercise time in the open-label, single-arm Phase 1 Reduce Elevated

Left Atrial Pressure in Patients with Heart Failure (REDUCE LAP-HF) study. [7]

Diseases of the pulmonary blood vessels and right ventricular dysfunction

3. Mechanism

Patients with left ventricular HF, including those with preserved ejection fraction (HFpEF), have a high risk of developing pulmonary hypertension, which affects 40–80% of individuals who suffer from the condition (PH). An increase in left ventricular filling pressure in HFpEF leads to pulmonary venous congestion and secondary pulmonary hypertension. Increased symptoms and a worse prognosis are associated with pulmonary hypertension (PH), and pulmonary arterial pressure (PAP) is a marker of the severity and duration of pulmonary venous congestion/hypertension in HFpEF. [9] In HFpEF, pulmonary capillary wedge pressure 15 mmHg (pre-capillary pulmonary hypertension) and isolated post-capillary pulmonary hypertension (IpcPH) overlap (or occur together) (combined pre- and post-capillary PH, CpcPH). Patients with HFpEF who have elevated pre-capillary PH have a worse prognosis and may respond (better) to pulmonary vasodilator therapy, thus it's important to identify them (Hoeper,et al. 2017). As many as 30% of individuals may have right ventricular dysfunction [10], however this number varies widely among diagnostic criteria. Sixth, RV dysfunction is associated with PH and its severity, and RV-arterial uncoupling is a major factor in the poor prognosis of HFpEF.

4. Results

ROC analysis was done for RVGLS in predicting HFpEF. It showed a significant AUC of 0.648 with a 95% confidence interval ranged from 0.538 to 0.758 (P = 0.011). The best cutoff point was ≤ -19.5%, at which sensitivity and specificity were 60% for each .

Table (1) ROC analysis of RVGLS in predicting HFpEF

ROC parameters	
AUC (95% CI)	0.678 (0.254 - 0.269)
Best cutoff	≤ 77.5
Sensitivity	79%
Specificity	74%
P-value	0.1152*

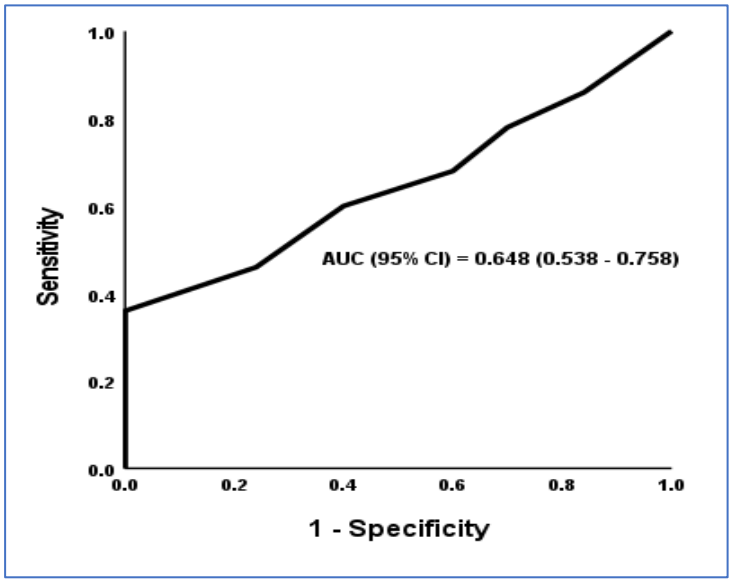

Fig. (1) ROC curve of RVGLS in predicting HFpEF

4. Conclusion

We find that 2D-RVGLS and RVFWSRS' are useful for predicting worse clinical outcomes in HFpEF patients via our analysis.

According to our findings, RV 2D-STE has the potential to aid in the identification of HFpEF patients at high risk for poor outcomes.

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