

Original Research Article

Early diagnosis HFpEF, heart failure with preserved ejection fraction in cardiomyopathy, a chance to treat and reduce morbidity and mortality

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ABSTRACT

Background: Cardiomyopathy as a diagnosis almost signifies a kind of end stage disease of the myocardium. With conditions like hypertension, diabetes and ischemic heart disease on the rise, we are seeing a large number of cases diagnosed as cardiomyopathy, most common presenting feature being Heart failure. Echocardiography (ECG), is non-invasive and easily available and can pick up early signs of failure in the form of diastolic and systolic dysfunction. To study patients with cardiac symptoms, by clinical, ECG, and Echocardiography parameters.

Methods: A cross-sectional, observational study of 50 patients aged 18-80 years with cardiac symptoms (dyspnoea, palpitations, pedal odema) was carried out over a period of 3 years in a semi-urban Medical College Hospital in Western Maharashtra. Patients of Acute coronary disease, valvular and congenital heart disease and chronic obstructive pulmonary disease (COPD) were excluded from the study. Data collected, tabulated and subjected to statistical analysis.

Results: Our study of 50 patients had 50% Diabetic and 42% Hypertensive patients. 2D echo findings were clinically significant in the form of diastolic dysfunction (36%), systolic dysfunction (12%). Ejection fraction (EF) was significantly reduced, in most patients, but 4% patients had HFpEF, i.e. EF=55% and 24% had EF between 30-55%

Conclusions: Our study of 50 patients of Cardiomyopathy had more hypertensives and diabetics, and most of them less than 60 years of age and mostly male. HFpEF was detected in 4% and 76% had EF30-60% and 24% had EF<30%. Diastolic dysfunction was diagnosed in more than half and systolic dysfunction in few on ECG.

Keywords: Cardiomyopathy, Heart failure, Ejection fraction, Diastolic dysfunction

INTRODUCTION

The most common presentation of Cardiomyopathy is Heart Failure. But when a stage of dilated cardiomyopathy with ejection fraction of 30% is diagnosed, nothing much can be offered to the patient other than a heart transplant. The primary, cardiomyopathies with a genetic mutation still form a small percentage, but diseases like diabetes, hypertension and ischemic heart disease are on the rise and lead to cardiomyopathy in the long run.¹ On

echocardiography however 2 types of heart failure can be diagnosed. HFpEF heart failure with preserved ejection fraction (55%) and HFrEF heart failure with reduced ejection fraction, usually less than 30%.² It is the HFpEF, which if diagnosed early, and treated can lead to decrease in the mortality and morbidity of Cardiomyopathy.

Aims and objectives

To study patients with cardiac symptoms, by clinical features, ECG, and echocardiography parameters.

METHODS

Ours was a cross-sectional, observational study of 50 patients carried out from July 2018 to August 2020 in a semi-urban Medical College Hospital in Western Maharashtra.

Inclusion criteria

Age 18-80 years with symptoms of dyspnoea on exertion, palpitations, chest pain, odema feet, syncopal attacks.

Exclusion criteria

Acute coronary syndrome, rheumatic valvular and congenital heart disease and COPD. Each patient was clinically examined, findings noted.

12 lead ECG, with analysis done. 2D Echocardiography and colour Doppler: with special attention to EF, diastolic and systolic function of left ventricle was carried out.

Data collected, tabulated and subjected to statistical analysis.

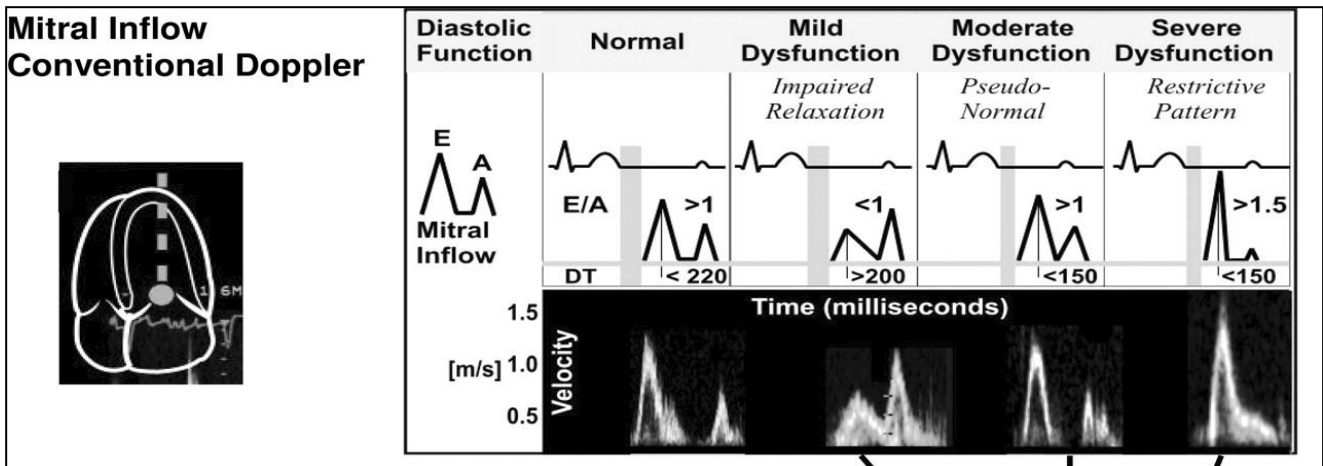


Figure 1: Source: Circulation. 2006;113: e396-e398. A Clinician’s Guide to Tissue Doppler Imaging, by Carolyn Y. Ho and Scott D. Solomon.²⁸

RESULTS

Our study of 50 patients had 66% of patients less than 60 years of age (i.e. still in economically viable group), males double the number of females. Commonest symptom was dyspnoea. ECG had only non specific ST-T changes.

were diabetic and 42% hypertensive. 4.8% of hypertensive cardiomyopathy had dilated left atrium.

Table 1: Relation of LVDD with Co-morbidity. In diabetics 24%, in hypertensive 28.5% and 75% IHD showed left ventricular diastolic dysfunction.

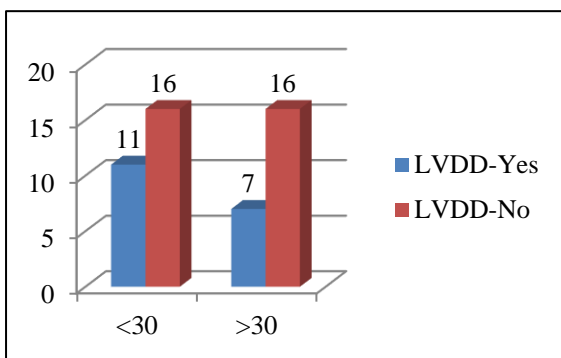


Figure 2: Comparison of ejection fraction (<30%, >30%) and LV diastolic dysfunction LVDD.

2D Echo was more diagnostic. Severely reduced EF <30% was seen in 76%, but the remaining 24% had EF between 30 and 50%, while 4% had HFpEF (heart failure with preserved EF). Diastolic dysfunction was diagnosed in 36%, and systolic dysfunction in 12%. 50% of patients

Variables	LVDD		Total
	Yes	No	
IHD	3 (75%)	1 (25%)	4
Hypertension	6 (28.5%)	15 (71.5%)	21
Diabetes	6 (24%)	19 (76%)	25

DISCUSSION

Cardiomyopathies have been recognized and classified over the years, the latest by Brunwald in 20th edition of Harrison’s Text Book of Medicine.^{1,2} Davies a pathologist from London in 2000, correlated his classification with histopathology and found changes and said that “Hypertensive cardiomyopathy and those secondary to systemic disease like Diabetes are seen more often now.”³ Pinto et al suggested a new entity in cardiomyopathy called ‘hypokinetic non-dilated cardiomyopathy’.⁴

Now in 2020, Merlo et al and Arbustini et al in their chapter Classification of cardiomyopathy European

society of Cardiology (ESC) guidelines include systemic diseases like hypertension and diabetes.^{5,6} They state that in late stage all these will present as dilated cardiomyopathies. However early signs of failure and echocardiographic study of diastolic dysfunction, can be indicators for treatment and prevention of dilated cardiomyopathy, where only a heart transplant can help.

Hypertensive cardiomyopathy was studied by Kurada et al especially the multidimensional impact of myocardial disorder in patients with hypertension.⁷ They concluded that patients of hypertension should undergo echocardiography and cardiac MRI and be treated optimally before development of left ventricular hypertrophy (LVH) to prevent hypertensive cardiomyopathy (HT-CM). In our study 42% of patients were hypertensive and on echocardiography many had diastolic dysfunction and 4% had left atrial dilatation both early signs of impending hypertensive cardiomyopathy and heart failure.

Jia et al described diabetic cardiomyopathy in 2018 found that “Diabetic cardiomyopathy is initially characterized by myocardial fibrosis, dysfunctional remodelling, and associated diastolic dysfunction, later by systolic dysfunction, and eventually by clinical heart failure.”⁸ Our study had 50% diabetics, of whom most had diastolic dysfunction and only few had systolic dysfunction and half the patients already had DCM with ejection fraction <30%.

Echocardiography has been extensively used to study the Heart both anatomically and functionally in real-time since the last 60-70 years.

It is now widely available, even in India, and is an efficient non-invasive test, modestly priced.

Nilda Espinola-Zavaleta called it CVS-Ultrasound, Lo published “Echocardiographic evaluation of Heart failure” Broch includes it in his diagnostic work up of Heart Failure, Andrew entitled his study as ‘CV Ultrasound’, DeMaria et al gave a detailed account in their chapter “Echocardiogram” in Hursts Text book of Heart.⁹⁻¹³ The Concept of HFpEF ‘Heart Failure with Preserved Ejection Fraction’ was put forward by Barry et al in 2011, later studied by Oktay et al and Menz in 2015, by Roe in 2017, by Harper in London in 2018.¹⁴⁻¹⁸

Diastolic dysfunction was exclusively studied by Mitter et al who came up with their publication “A Test in Context E/A and E/e/ to Assess Diastolic Dysfunction and LV Filling Pressure.”¹⁹ Plitt et al in Spring 2018, in their study on HFpEF studied “Mechanisms, Diagnosis, Treatment of HFpEF” and correlated it with diastolic dysfunction on echocardiography. Gavaert et al physiologists also studied HFpEF, clinically and in 2019 Hiebert et al and Fang et al studied Ejection fraction and Left ventricular function by ‘Spekle Tracking’ on Echo and Doppler, which gave a better idea of EF.²⁰⁻²³

In our study Echocardiography and Doppler was performed on every patient, and Diastolic dysfunction studied using E/A ratio as a marker of LV function. LVEF left ventricular ejection fraction was derived by LVEF: (SV/EDV)×100. We detected diastolic dysfunction in 36% and Systolic dysfunction in 12%. Ejection fraction of <30% was seen in 76%, EF 30-50 seen in 24% and HFpEF seen in 4%.

Management of HFpEF was studied by Paulino et al in 2017, Breitenstein in the study “Devices in Heart Failure” tell us ‘Who will benefit from ICD /CRT devices in Heart Failure, which has now become a standard therapy to maintain Left Ventricular Function in patients waiting for a Heart-transplant or in whom it is not feasible.^{24,25} Barry conducted Epidemiological studies by American Heart Association way back in 2006, assessed the prevalence of cardiomyopathy and heart failure, carried out functional genomic studies, and stated that by the use of good diagnostics a lot of cardiomyopathy patients could be prevented from going into dilated cardiomyopathy and low ejection fraction heart failure, where nothing short of heart transplant would help.²⁶ Lenhart studied genetic mutations of primary cardiomyopathies.²⁷

Thus, the emphasis today is on diagnosing early heart failure in cardiomyopathy.

And being aware of the condition called HFpEF “Heart failure with preserved Ejection Fraction”.

Prevalence of primary cardiomyopathies with genetic mutations has remained the same and is low. However, cardiomyopathies secondary to diseases like hypertension and diabetes is on the rise. In these conditions, diastolic dysfunction is a clue to HFpEF and must be looked for and treated.

Limitations

Small sample size.

CONCLUSION

Our study of 50 patients of cardiomyopathy had more hypertensives and diabetics, and most of them less than 60 years of age, and mostly male. HFpEF was detected in 4% and 76% had EF 30-60% and 24% had EF <30%. Diastolic dysfunction was diagnosed in more than half and systolic dysfunction in few on echocardiography.

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