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Research Article

Echocardiographic study on Dilated Cardiomyopathy from Eastern India

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Abstract

Background: Dilated cardiomyopathy (DCM) is an important cause of mortality and morbidity. Echocardiography is an important tool to assess patients with DCM and also as a prognostic guide. Left atrial size, as measured in echocardiography, is considered an important prognostic marker in this condition. However, studies concerning echocardiography of DCM patients are very rare from India.

Patients and methods: This was a retrospective hospital based study, done in a tertiary care hospital of Eastern India. Echocardiographic and demographic data of adult patients admitted within a five-month time period were analysed. All measurements were done by the same expert operator. Standard statistical method was used.

Results: There were a total of 42 patients in this study with male: female ratio of 25:17. 64% of the patients belonged to the 50—70 year age group. Enlarged left atrium (diameter>40 mm) was found in 31 patients and 6 patients (14%) had systolic left ventricular diameter (LVIDS)>60mm. there was statistically significant positive correlation of left atrial size with LVIDS (r=0.32; p=0.039) and left atrial size with age of the patients (r=0.49; p=0.0009).

Conclusion: There was significant left atrial enlargement in this sample Indian population. Further larger studies are needed to find the role of different echocardiographic parameters including left atrial size, in DCM patients in this part of the world.

Keywords: Dilated cardiomyopathy, left atrial size, echocardiography, left ventricular diameter

1. Introduction

Dilated cardiomyopathy (DCM) is the most common type of cardiomyopathy worldwide[1]. There are various causes of this disease including genetic, autoimmune, infiltrative or infective causes[1]. In many cases, despite investigations, the cause remains unknown. The prevalence of DCM varies widely in different regions. In one study, the prevalence in adults was found to be 1 in 2500[2]. Of this, familial or genetic causes may account for as high as 20—48% of the etiologies[2].

DCM is important as it may cause heart failure, arrhythmia or sudden cardiac death. Thus, it accounts for significant number of emergency visits or intensive care admissions.

Echocardiography is an essential tool for evaluation of patients with DCM. Besides the basic pulse-Doppler echocardiography, many new techniques are now being used for better evaluation of cardiac structure and function in DCM, like tissue Doppler and speckle tracking. Echocardiography is important not only for diagnosis of the condition but also to assess prognosis and guide therapeutic interventions[3]. Besides ejection fraction, other echocardiographic measures like left and right ventricular dimensions and left atrial size and volume are also important for prognosis in these patients[3]. Of these different dimensions left atrial size (LAS) is now considered as an important marker of cardiac function[4]. LAS is found to be related to left ventricular dimensions and increasing LAS is also related with thromboembolic episodes in these patients[4]. In a study from Turkey, the authors also found increased prevalence of atrial fibrillation in DCM patients with increased LA maximal area[5].

However, studies from India concerning echocardiographic findings in DCM are very rare. A study from the Indian subcontinent (Pakistan) found the mean LA diameter of DCM patients to be 42.8±7.1 mm[6]. The authors of that study did not analyse correlation of LAS with other echocardiographic or clinical parameters. Another study, also from Pakistan, found that increased LAS was present in 72% of patients with DCM[7].

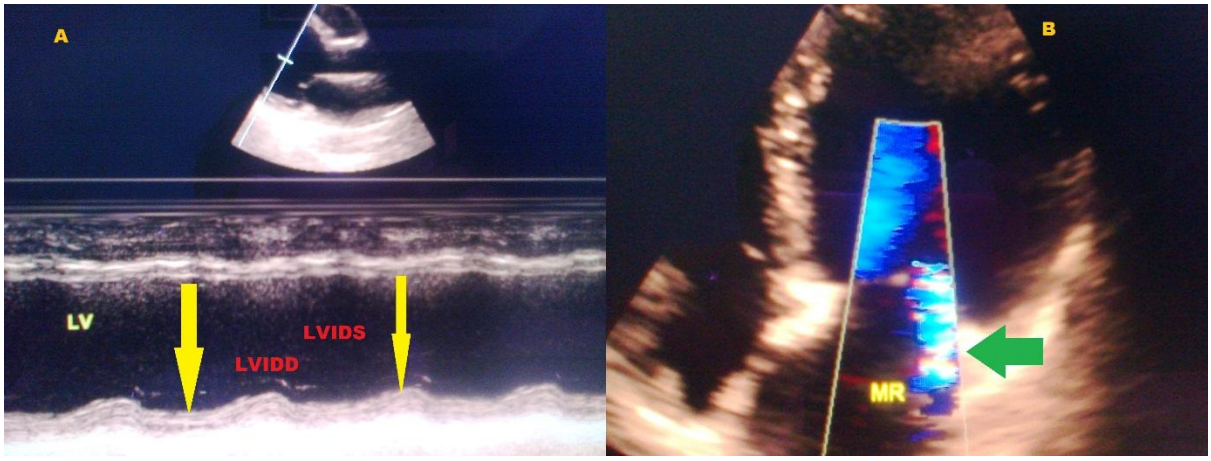
We therefore undertook this small pilot study in a tertiary care hospital of Eastern India. The aim was to generate some data on DCM, which can be used for further research.

2. Materials and methods

This was a retrospective hospital based study involving indoor patients of medicine department of a tertiary care medical college of Eastern India. Only adult patients (>18 years of age) were considered. Records of patients, admitted between 1st march, 2014 and 31st July, 2014, diagnosed as 'dilated cardiomyopathy' were analysed for the echocardiographic findings. The study was approved by the hospital ethical committee and full patient confidentiality was maintained.

All the echocardiographs were done with a Philips Envisor machine version C.1.3 model number M2540A. For this study, the data from a single operator only was included, in order to avoid inter-observer variations. The operator, the person who did all the echocardiographs, was trained in non-invasive cardiac imaging. Each patient had trans-thoracic echocardiography done in para-sternal long and short axes and also 4-chamber views (figure 1). Left ventricular internal diameter in systole (LVIDS), internal diameter in diastole (LVIDD) and left atrial diameter (LAD) were measured in M mode. Ejection fraction was calculated using the inbuilt software in the machines. All measurements were taken thrice and the average of three measurements were recorded.

Figure 1: Figure showing echocardiographic pictures [A]measurement of LV dimensions in M mode, yellow arrows and [B] 4-chamber view with mitral regurgitation (green arrow)



At first 105 patients who were diagnosed as DCM during the said period were selected. However, the records from many of them were incomplete and in some, the data was not plausible. Thus, many of the patients were excluded.

2.1 Statistical methods

Standard statistical software like MedCalc and GraphPad were used for calculation. The data was at first arranged in Microsoft Excel worksheet and then analysed using standard techniques. P value<0.05 was considered significant.

3. Results

There was a total of 42 patients in this study. The overall male: female ratio was 25:17. As table 1 show, in the under-50 age group, all patients were female. However, in above-50 age group, the male: female ratio was 25:10. Overall, the highest number of patients belonged to the 50—70 age group (n=27; 64.3%). 9.5% of the patients were ≤30 years of age.

Table 1: Table showing the age and gender distribution of our patients

Age-group (years)	Male	Female	Total
≤ 30	0	4	4
31-40	0	1	1
41-50	0	2	2
51-60	10	3	13
61-70	8	6	14
>70	7	1	8

Table 2 shows the echocardiographic findings of the patients. It is seen that 38% of the patients had ejection fraction<30%. Left atrial size>40 mm was present in 31 (73.8%) of the patients and 3 (7.1%) had atrial size>50 mm.

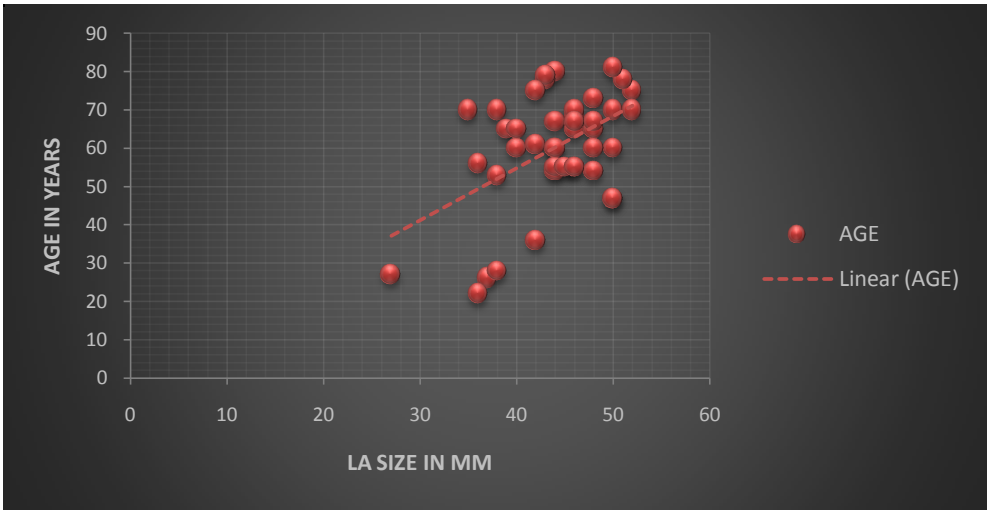
Table 2: Echocardiographic findings of the patients

Parameter		Number of patients	Percentage
Ejection fraction	<30%	16	38.1
	30-50%	26	61.9
	>50%	0	0
Left atrial size	≤40 mm	11	26.2
	41-50 mm	28	66.7
	51-60 mm	3	7.1
	>60 mm	0	0
Left ventricular diameter (diastole) LVIDD	≤60 mm	15	35.7
	61—70 mm	20	47.6
	71—80 mm	7	1.7
	>80 mm	0	0
Left ventricular diameter (systole) LVIDS	≤40 mm	0	0
	41—50 mm	10	23.8
	51—60 mm	26	61.9
	>60 mm	6	14.3

All the patients had left ventricular systolic diameter >40 mm. LVIDS> 60 mm was found in 14.3% of cases. Left ventricular diastolic diameter >60 mm was found in 27 patients.

Statistical calculation revealed a correlation coefficient of 0.32 between LVIDS and LA size (2-tailed p value: 0.039). The correlation of left atrial size with LVIDD (r=0.29) and ejection fraction (r=-0.11) were non-significant. However, there was a stronger correlation of left atrial size with age (r=0.49; p=0.0009; figure 2). There was no significant gender difference in left atrial size (44.3±4.8 mm in males vs. 43.5±6.3 mm in females; p=0.63).

Figure 2: X-Y scatter plot of LA size in mm (X-axis) and age in years (Y-axis) of patients



4. Discussion

In this retrospective study, a large number of patients with dilated left atrium were documented and this left atrial size correlated with some of the left ventricular dimensions and age of the patients.

In a study from Eastern Europe involving 95 patients, the authors found that left ventricular end diastolic diameter correlated significantly with LA diameter (r=0.47), LA area (r=0.49) as well as volume (r=0.45)[4]. Mean LA diameter of the patients in that study was 46.02±5.07 mm[4]. In present study, the mean LA diameter was 43.95±5.38 mm. However, in present study, the statistical correlation between LAD and LVIDD was weak, probably due to the small number of patients. Left atrial volume is an even better marker of prognosis in DCM, compared to LAD[8]. LA volume is found to be an independent predictor of mortality in DCM patients[8]. However, the present study was a retrospective one and left atrial volume is not routinely measured in the study hospital. Thus, we did not have the echocardiographic volume measurements. In our study we also found significant correlation of LAS with LVIDS. Other studies have also found this association of left atrial dimensions with ventricular systolic function. In one study, left atrial volume increased significantly with systolic dysfunction of the left ventricle[9]. In another study involving hypertensive adults, left ventricular internal diameter was significantly more in patients with enlarged LA[10]. Other echocardiographic measurements like circumferential end-systolic stress, relative wall thickness or midwall shortening may be better correlates of left atrial geometry[10]. But these are not routinely done in the present study hospital.

In this study, left atrial diameter was significantly correlated with age of the patients (r=0.49). Left atrial dimensions increase normally with age[11]. However, this change is smaller compared to DCM patients. In one study from UK, the average LAD in those aged≥ 80 years was 4.19±0.51 cm. In older persons with DCM, left atrial size is an additional marker of morbidity. A study from Italy found that in patients >70 years, indexed LA size was the best predictor of death with a hazard ratio of 3[12]. Also, LA size had the best predictive power among all other variables in predicting the combined end points in that study.

There are various other echocardiographic predictors of mortality and morbidity in DCM. In one study, tricuspid diastolic velocity by tissue Doppler was found to be a good prognostic measure, especially in children[13]. Other markers include LV sphericity index, diastolic filling period, presence of valvular regurgitation and presence of right ventricular changes[3]. However, these measurements need specialized machines and more importantly, trained technicians, which is not always available.

While left atrial changes are generally thought to be secondary to left ventricular dysfunction, some authors are of the opinion that there is also a component of primary cardiomyopathy of the atria[14]. Necropsy studies from DCM patients have also discovered myopathic changes in atrial musculature in DCM patients[15]. Thus, although DCM is thought to be a disease of primarily the ventricles, atria may also be simultaneously involved.

This study is limited by the small number of patients and the retrospective nature of the study. Also, the echocardiographic parameters were very few in number. However, this study generates the preliminary data based on which future larger studies on DCM may be done.

5. Conclusion

This small pilot study from Eastern India corroborates the data found in other parts of the world. This study emphasizes the importance of measuring left atrial dimensions in our patients. Further multicentric studies are needed in order to characterize the role of echocardiography in DCM patients in India.

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