Original Research Article

Clinical presentation and electrocardiographic characteristics of patients with dilated cardiomyopathy

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Abstract

Background: Dilated cardiomyopathy is being recognized as a significant cause of morbidity and mortalitydue to increased awareness along with improvement in diagnostic techniques. Present study was undertaken to focus on dilated cardiomyopathy in Indian patients and to look for correlation between clinical and electrocardiographic features. **Material and Methods:** The present study was performed in 50 patients of dilated cardiomyopathy diagnosed by echocardiography either admitted in a teaching hospital or attending cardiology clinic. Detail history and clinical examination was done in each patient. Standard 12 lead electrocardiograms were recorded as 25 mm per second and 1 mV per cm standardization. **Results:** All ages were affected but elderly and middle aged population were predominantly affected. Etiology could not be found in 42% of patients but alcohol was associated risk factor in 36 % of the patients. Dyspnea was invariably present in all patients followed by fatigability, swelling over feet, cough. Raised JVP, edema over feet, gallop rhythm, systolic murmur, congestive hepatomegaly and respiratory rales were common findings.Left axis deviation, LVH, bundle branch block, atrial fibrillation were common ECG abnormalities. **Conclusion:** Clinical and ECG characteristics areuseful indicesthat may reflect the severity and progression of DCM.

Key Words: Dilated cardiomyopathy, dyspnea,electrocardiography, left ventricular hypertrophy.

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Email: sadakamble@gmail.com
Received Date: 15/05/2017 Revised Date: 20/06/2017 Accepted Date: 22/07/2017
DOI: https://doi.org/10.26611/10213110

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 23 July 2017

INTRODUCTION

Dilated cardiomyopathy (DCM) is a syndrome characterized by cardiac enlargement and impaired systolic function of one or both ventricles. The word dilated is preferred to congestive as earliest abnormality is ventricular dilatation while systolic contractile dysfunction and congestive heart failure developing later[1]. With increasing awareness of this condition along with improvement in diagnostic techniques, dilated cardiomyopathy is being recognized as a significant cause of morbidity and mortality. The most striking symptoms are those of left ventricular failure[1].

Dyspnea and palpitation are the most common symptom[2]. Fatigue and weakness are due to diminished cardiac output. Chest pain is not an uncommon symptom and may suggest concomitant ischemic heart disease. Some studies have demonstrated that patients of DCM can be detected in asymptomatic phase before development of symptomatic LV dysfunction and treatment of asymptomatic LV dysfunction reduces the morbidity and mortality associated with overt congestive heart failure[3,4]. Aggressive approach to the diagnosis and treatment of asymptomatic patients are advised. DCM usually presents with electrocardiographic (ECG) signs of left ventricular (LV) hypertrophy similar to those seen in hypertensive patients[5,6].

However, to elucidate a more characteristic ECG pattern of DCM, 12-lead ECGs of DCM were analyzed.DCM is a topic of interest of physician, cardiologist, cardiac surgeons and many other group of scientists. Present

How to cite this article: Sadanand D Kamble, Rajesh R Bobade. Clinical presentation and electrocardiographic characteristics of patients with dilated cardiomyopathy. *MedPulse International Journal of Medicine.* July 2017; 3(1): 41-45. https://www.medpulse.in/Medicine/

study was undertaken to focus on dilated cardiomyopathy in Indian patients and to look for correlation between clinical and electrocardiographic features.

MATERIAL AND METHODS

The present study was performed in 50 patients of dilated cardiomyopathy diagnosed by echocardiography[3]either admitted in a teaching hospital or attending cardiology clinic. 30 patients were male and 20 were female. Patients presenting with signs and symptoms of congestive cardiac failure, asymptomatic patients having unexplained cardiomegaly on Chest X-ray, abnormal ECG changes were included and those with signs and symptoms of congestive cardiac failure with cardiomegaly on Chest X-ray due to other diseases like coronary artery disease, rheumatic valvular heart disease, congenital heart disease, pericardial disease were excluded.

After selection of patients, detail history was obtained from each patients. Each patient was specifically asked about dyspnea, palpitation, fatigability, sweating, swelling over feet, abdominal pain, syncope, and chest pain. Dyspnea was classified according to NYHA classification[7]. Patient was asked regarding the major illness like Hypertension, Diabetes Mellitus, Myocardial Infarction, Renal disease, COPD. Personal history of addiction was asked. Patients were considered alcoholic who fulfilled the Diagnostic and Statistical Manual (DSM-IV)[8] of American Psychiatric Associations.

In females, detailed obstetrical history was asked. Peripartum cardiomyopathy was diagnosed by criteria adapted in a workshop on peripartum cardiomyopathy conducted by National Heart, Lung and Blood Institute and Office of Rare Diseases. Family history suggestive of dilated cardiomyopathy was asked. Complete clinical examination was carried out. On physical examination, special attention was given to presence of raised JVP, edema, gallop rhythm, systolic murmur, respiratory rate and congestive hepatomegaly.

Comprehensive M- mode, two dimensional and Doppler echocardiographic examinations were performed in all patients. Routine laboratory investigations such as BSL profile, Liver function tests, Renal function tests, Serum calcium and phosphorus, and serum cholesterol were done. Standard 12-lead electrocardiograms were recorded as 25 mm per second and 1 mV per cm standardization. Rate, rhythm, P-R interval, QRS interval, QTc interval were measured.QRS axis was determined in frontal plane. Axis directed to the region between 0 counter clockwise to 90 was taken as left axis deviation. P wave abnormalities were noted.

Left atrial enlargement was defined as P terminal force in V1 equal to more negative than -0.04 mm sec or notched P wave with duration of 0.12 second or more. Right atrial enlargement was the presence of peaked P wave with a height of 2.5 mm or more in a lead II, III, and avF. Biatrial enlargement was defined as presence of large diphasic P wave in lead V1 with the initial positive component reading greater than 1.5 mm and the terminal negative component reading 1 mm in amplitude and 0.04 sec. in duration. Left ventricular hypertrophy was defined as per Sokolows criteria[9] as R-wave in V5 or V6 + S-wave in V1 > 35 mm. Ratio of R wave in V6 and maximum R wave in leads I, II, III (RV6/R max) was calculated to find out the correlation the correlation of this ratio with ventricular dilatation and ejection fraction. ST segment and T wave abnormalities were noted.

RESULTS

In present study, dilated cardiomyopathy was more common in the middle age, most common in fifth decade. Males were affected more common than female with a ratio of 3:2. In 42% of the patients, no significant risk factor was present, while in 36% of the patients, alcohol was the risk factor (Table 1).

Table 1: Age and Sex Distribution

Demographic characteristics	No. of cases	%
Age in years		
10 - 19	02	04
20 - 29	06	12
30 - 39	06	12
40 – 49	17	34
50 - 59	08	16
> 60	11	22
Sex		
Male	30	60
Female	20	40
Risk factors		
DM	03	06
HTN	02	04
Alcoholism	18	36
Family history	02	02
Peripartum	05	10
No risk factors	21	42

Dyspnea was present in all patients and majority of patients had higher NYHA class (i.e. Class III or IV). Fatigability (72%), cough (60%), swelling over the feet (56%) and palpitations (50%) were other predominant symptoms. Chest pain, abdominal pain, fever, syncope were uncommon symptoms. None of the patients was asymptomatic (Table 2).

Table 2: Symptomatology of DCM

Symptoms	No. of cases	%
Dyspnea		
I	00	00
II	06	12
III	24	48
IV	20	40
Palpitation	25	50
Fatigue	36	72
Swelling of Feet	28	56
Abdomen Pain	12	24
Syncope	01	02
Cough	30	60
Fever	10	20
Chest Pain	15	30

In the present study, in 50 patients, mean pulse rate was 105.3 ± 9.47 per min, systolic BP was 113.44 ± 25.03 and diastolic BP was 73.68 ± 12.28 mm of Hg. On examination, most patients were found to have signs of CCF with edema on feet (86%), raised JVP (96%) and congestive hepatomegaly (90%) (Table 3).

Table 3: Clinical Features of DCM

Clinical Features	No. of cases	%
J.V.P. Raised	48	96
Edema	43	86
Icterus	13	16
Thrill	01	02
Systolic Murmur	25	50
Gallop	46	92
Loud p2	09	18
R/S	37	74
Hepatomegaly	45	90
Ascites	05	10

Mean ventricular rate in the present study was 107.0±10.51 per min. Most of the patients had sinus tachycardia as they were in congestive heart failure. Range of QRS axis was from – 50^0 to + 90^0. Left axis deviation was seen in 22 (44%) patients. PR interval ranged from 0.16 to 0.26 seconds with mean of 0.176 ± 0.0303 seconds. 5 patients (10%) had first degree AV block. No patients had second or third degree AV block. Mean left ventricular QRS voltage (S in V_1 + R in V_5 or V_6) was 32.38 ± 11.08 mm. 22 patients had evidence of LVH on ECG (Table 4).

Table 4: ECG Abnormalities in Dilated Cardiomyopathy

ECG features	Number	Percentage
Left axis deviation (<0^0)	22	44
Atrial enlargement Total	14	
Right	04	
Left	08	28
Biatrial	02	
Left ventricular hypertrophy (S in V1 + R in V5/V6 > 35mm)	22	44
R V6 / R max ≥ 0.3	19	38
QRS duration ≤ 0.10 sec	31	62
0.11 to 0.12 sec	10	20
≥ 0.12 sec	09	18
AV Blocks Total	05	10
First degree	05	10
Second degree	00	00
Third degree	00	00
Bundle branch block Total	19	38
LBBB	09	18
RBBB	03	06
LAHB	07	14
Arrhythmia Total	09	18
Atrial fibrillation	05	10
Ventricular ectopics	03	06
Nonsustained VT	01	02

DISCUSSION

In DCM, electrocardiographic characteristics are not specifically defined, although it is well known that signs of LV hypertrophy commonly exist[5,6]. In the present study dilated cardiomyopathy was more common in middle age and elderly but commonest age group affected was 31-70 years. Males were affected more than females. Parale *et al*[10], Karl *et al*[11] and Rihal *et al*[12] also reported similar findings. In 42% of the patients, no significant risk factor was present, while in 36% of the patients, alcohol was the risk factor. Fuster *et al*[13] in their study of 104 patients of dilated cardiomyopathy found that in 49% of patients no risk factor could be identified. 21% patients gave history of excessive consumption of alcohol. In India, Parale *et al*[10] found that out of 40 patients of dilated cardiomyopathy, 3 patients had diabetes, 2 were alcoholics and 5 were in peripartum period dilated cardiomyopathy was idiopathic in 30 (75%) of patients. In the present study, dyspnea was invariable and was present in all 50 (100%) patients. Fatigability (72%), cough (60%), swelling over the feet (56%) and palpitations (50%) were other predominant symptoms. None of the patients was asymptomatic. Karl *et al*[11], Parale *et al*[10] and Grimm *et al*[14] have reported dyspnea in 100% patients of dilated cardiomyopathy. In the present study, only one patient had syncope. ECG in that patient showed nonsustained ventricular tachycardia. In the present study, in 50 patients, mean pulse rate was 105.3 ± 9.47 per min, systolic BP was 113.44 ± 25.03 and diastolic BP was 73.68 ± 12.28 mmHg. On examination, most patients were found to have signs of CCF with edema on feet (86%), raised JVP (96%) and congestive hepatomegaly (90%).On cardiovascular examination, gallop rhythm was present in 92%, systolic murmurs in 50%, loud P2 in 18% and precordial thrill in 2% of the patients. 74% of patients had respiratory rales and 10% patients had ascites. Rihal *et al*[12] found in patients of

dilated cardiomyopathy, systolic BP was 124 ± 19 and diastolic BP was 80 ± mm of Hg. Andersson *et al*[15] have found that mean heart rate was 78 ± 16 per min, systolic BP was 124 ± 22 and diastolic BP was 76 ± 11 mm of Hg. Parale *et al*[10] have found that elevated JVP, peripheral edema, congestive hepatomegaly, third heart sound and cardiomegaly were common signs in dilated cardiomyopathy. In the present study, most of the patients had signs of biventricular failure. Reduced right ventricular compliance, whether by precordial constraint or myocardial restriction may be operative in advanced stages of chronic cardiomyopathy. This concept was supported by Sassoon *et al*[16] after their study on hepatic pulsations in patients with dilated cardiomyopathy.

Mean ventricular rate in the present study was 107.0 ± 10.51 per min. Most of the patients had sinus tachycardia as they were in congestive heart failure. Tachycardia in patients with dilated cardiomyopathy is also reported by studies done by Werner *et al*[17] and Wilensky *et al*[18]. In the present study, range of QRS axis was from – 50^0 to + 90^0. Left axis deviation was seen in 22 (44%) patients. Parale *et al*[10] have found left axis deviation in 59% of patients. Techuan Chou[9] mentions that left axis deviation is seen in 42% of patients of dilated cardiomyopathy. In the present study, PR interval ranged from 0.16 to 0.26 seconds with mean of 0.176 ± 0.0303 seconds. 5 patients (10%) had first degree AV block. No patients had second or third degree AV block.AV blocks are poor prognostic markers in dilated cardiomyopathy and the progress over time with increasing fibrosis and myocyte hypertrophy. In the present study, AV block were seen in 10% of cases comparable to other studies. P waves were absent in 5 patients with atrial fibrillation, 14 (28%) patients had abnormal P waves. Techuan Chou[9] mentions that in a series of 40 patients, P wave abnormalities were noted in 15 patients. Left atrial enlargement was the most common feature. As reported by others in the present study also left atrial enlargement on ECG was more common than right atrial or biatrial enlargement. In the present study, mean left ventricular QRS voltage (S in V_1 + R in V_5 or V_6) was 32.38 ± 11.08 mm. 22 patients had evidence of LVH on ECG. Results in the present study were comparable with studies by Roberts *et al*[3] and Momiyama *et al*[19]. Techuan Chou[9] mentions that relative incidence of LBBB in idiopathic dilated cardiomyopathy is higher than in IHD. In patients with cardiomegaly of unknown cause, the presence of LBBB further supports the diagnosis of primary myocardial disease. Abnormal left axis deviation consistent with LAHB also is common, occurring in as many as 42% in some series[16]. As reported by Barboso *et al*[20] and Schoeller *et al*[21] in the present study also intraventricular conduction abnormalities were common. In DCM, though all ages were affected but elderly and middle aged population were predominantly affected. Etiology could not be found in 42% of patients but alcohol was associated risk factor in 36% of the patients. Dyspnea was invariably present in all patients and majority of patients had severe dyspnea [NYHA class III (48%) and IV (40%)]. Fatigability, swelling over feet and cough were other common symptoms. Raised JVP, edema over feet, gallop rhythm, systolic murmur, congestive hepatomegaly and respiratory rales were common findings. Left axis deviation, LVH, bundle branch block, atrial fibrillation were common ECG abnormalities.

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Source of Support: None Declared
Conflict of Interest: None Declared