Baseline characteristics and resting electrocardiogram of patients of dilated cardiomyopathy.

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Abstract
Background: *Dilated cardiomyopathy is thecommon cardiomyopathy worldwide and is an important cause of heart failure. They can have different electrocardiographic findings with significance in their symptoms and disease progression. This study was conducted to uncover baselinecharacteristicsand to analyze resting electrocardiogram of patients of dilated cardiomyopathy.*
Material &Methods: *A cross sectional study conducted inManmohan Memorial Community Hospital, Thamel Kathmandu Nepal from September 2017 to August 2018including 51 patients of dilated cardiomyopathy. Patients were interviewed regarding their baseline characteristics and 12 lead electrocardiograms were obtained.*
Results: *Among 51 patients, 26(50.98%) were male. Mean age of presentation was 56.65±16.28 years. Among them 19 (37.25%) were newly diagnosed. Twenty-one (41.17%) were on New-York Heart Association functional class II followed by 13 (25.49%) on class I. Diuretics were taken by 26 (81.25%) and Angiotensin Converting Enzyme Inhibitor /Angiotensin Receptor Blocker by 17 (53.12%) of the old diagnosed. Sixteen (31.32%) had atrial fibrillation. Left axis deviation was present in 20 (39.21%) and left bundle branch block in 15 (29.41%). Left ventricular hypertrophy was present in 15 (29.41%). ST depression and T wave flattening / inversion were present in 16 (31.37%) and 21 (41.17%) respectively.*
Conclusions: *Almost equal numbers of female patients were suffering from dilated cardiomyopathy as compared to male. Mean age of presentation was comparable. Diuretics were the most common drug of old diagnosed patients. Atrial Fibrillation, Left Axis Deviation, Left Bundle Branch Block, Left Ventricular Hypertrophy and ST-T changes were common findings.*
Key Words: *Cardiomyopathy, Dilated cardiomyopathy, Electrocardiogram.*

I.   Introduction:

Cardiomyopathies are group of disease that primarily affect the heart muscle and are not the result of congenital, acquired, valvular, hypertensive, coronary arterial or pericardial abnormalities.[1] Cardiomyopathy results from insult to both cellular element of heart notably cardiac myocytes and the process that are external to the cells such as deposition of abnormal substances in the extra cellular matrix.[2] Cardiomyopathies are traditionally defined on the basis of structural and functional phenotypes into dilated, hypertrophic and restrictive varieties.

Dilated Cardiomyopathy (DCM) is the most common cardiomyopathy worldwide. It is characterized by left ventricular dilation that is associated with systolic dysfunction. Diastolic dysfunction and impaired right ventricular function can develop. Idiopathic dilated cardiomyopathy remains an important cause of systolic heart failure and the common cause of heart failure in young people.DCM is associated with sudden cardiac death and heart failure, resulting in a large cost burden because of the very high rate of hospital admission and the potential need for heart transplantation.[3]DCM develops at any age, in either sex, and in people of any ethnic origin and its prevalence in the general population remains undefined.[3,4] In many cases, the disease is inherited, and is called familial DCM. The familial type might account for 20-48% of all cases.[5]

Patients with DCM have protean electrocardiographic (ECG) manifestations, including bundle branch block, left ventricular hypertrophy (LVH), atrial enlargement, atrial and ventricular dysrhythmia, non-specific ST segment and T wave changes.[6] Studies have shown abnormal ECG findings are associated with significant greater left ventricular dilatation and systolic dysfunction. Lower left ventricular ejection fraction (LVEF) are observed in patients with atrial fibrillation(AF), left atrial enlargement and T- wave inversion.

This study was designed to see the basic characteristics of patients of DCM and to analyze their resting ECG for the presence of AF, left axis deviation (LAD), left bundle branch block (LBBB), LVH, ST depression and T wave flattening/inversion.

II. Materials And Methods:

This was a cross sectional study conducted among the 51DCM patients at Manmohan Memorial Community Hospital Thamel Kathmandu Nepal for 1 year duration from September 2017 to August 2018. Adult patients, 18 years and above wereincluded consecutively. Both newly diagnosed and old cases were included. Their detail history were taken and clinical examinations were done. Basic investigations including an ECG, X-ray chest and echocardiogram were obtained. Patients had to fulfill the echocardiographic criteria for DCM to be included.

On the basis of echocardiography, DCM was diagnosed if there was global left ventricle (LV) wall hypokinesia with an ejection fraction (EF) <45%, and/or a fractional shortening <25%, in association with a dilated LV evidenced by LV end-diastolic diameter more than 5.6 cm.

Standard 12-lead ECG were recorded at 25 mm/s speed, and calibrated to 1 mV/cm. ECG was analyzed for the presence of AF, LAD, LBBB, LVH, ST depression and T wave flattening and inversion.

Patients with history of anginal pain were excluded. Patients with documented coronary artery disease (CAD) were excluded. Patients with Blood Pressure 140/90 mmHg or more were excluded. Patients with aortic stenosis were excluded. Similarly patients with regional wallmotional abnormalities in the echocardiogram were also excluded.LVH was diagnosed using voltage criteria (SV1or SV2 + RV5 or RV6 equal or more than 3.5 mV).

III. Results:

A total of 51 patients of DCM were included. Among them 26 (50.98%), were male. Mean age of presentation was 56.65±16.28 years. Among them 19 (37.25%) were newly diagnosed DCM and rest were previously diagnosed. The mean age of diagnosis of DCM was 53.23±15.47 years. The New York Heart Association (NYHA) functional class of symptoms at presentation was 13 (24.49%) class I, 21 (41.17%) class II, 12 (23.52%) class III and 5 (9.80%) class IV.

Of the total 32 (62.62.75%) old patients of DCM, 26(81.25%) were taking diuretics, 17 (53.12%) weretaking Angiotensin Converting Enzyme Inhibitor (ACE) / Angiotensin Receptor Blocker (ARB), 13 (40.62%) Digoxin, 11 (34.37%) Aspirin, 12 (37.50%) Beta blocker and 5 (15.62%) Warfarin.Three (9.37%)were nottaking any medication. The baseline characteristics of the enrolled DCM patients are shown in Table1.

Table 1: Baseline characteristics of enrolled patients.

Characteristics	Values
Age: Mean±SD	56.65±16.28 years
Sex Male/Female: No (%)	26/25 (50.98%/ 49.02%)
Newly Diagnosed DCM: No (%)	19(37.25%)
Old Cases of DCM: No (%)	32 (62.75%)
NYHA Class: No (%) I II III IV	 13 (25.49%) 21 (41.17%) 12 (23.52%) 5 (9.80%)

Medication History of old patients: No (%)
    Diuretics
    ACEI/ARB
    Digoxin
    Aspirin
    Beta-blocker
    Warfarin
    Not under any medication
	N=32
	26 (81.25%)
	17(53.12%)
	13(40.62%)
	11 (34.37%)
	12 (37.50%)
	5(15.62%)
	3 (9.37%)

Among the patients of DCM, 16 (31.32%) were having AF. LAD was present in 20 (39.21%)of the patients. LBBB was present among 15 (29.41%) of the patients. Voltage criteria for LVH was met by 15 (29.41%) of the patients. ST depression and T wave flattening/ inversion were present in 16 (31.37%) and 21 (41.47%) of the patients respectively. The summary of ECG findings are shown in Table2.

Table 2: The basic ECG changes of enrolled patients.

ECG changes	No.	Percentage (%)
AF	16	31.32
LAD	20	39.21
LBBB	15	29.41
LVH	15	29.41
ST depression	16	31.37
T wave flattening/ inversion	21	41.17

IV. Discussion:

The mean age of enrolled DCM patients were comparable to those in literatures. In this study mean age of presentation was 56.65±16.28 years. Similar study had shown mean age 59.3±11.8 years.[6] Literatures have shown DCM more prevalent among male.[3] This study however found almost equal number of female (49.02%) were having DCM.

Clinical presentations of DCM can be variable. Asymptomatic patients may be diagnosed during routine screening or family evaluation of established cases. Patients more typically present with signs and symptoms of pulmonary congestion and/or low cardiac output, often on a background of exertional symptoms.[7] In this study 21 (41.17%) patientswere at NYHA class II followed by 13 (25.49%) at NYHA class I during presentation.So,66.66% patients were either at class I or II during presentation. A total of 5 (9.80%) patients were at NYHA functional class IV.

Among the 32 old diagnosed case of DCM, 26 (81.25%) were taking diuretics and 17 (53.12%) weretaking ACEI/ARB. Three patients (9.37%) were not taking any medication. Lack of awareness and ignorance could have been responsible. Encourage to the medicine adherence can obviously improve outcome.

This study found 16 (31.32%) patients of DCM in AF. Tan and colleagues had described 35% of their DCM subjects were on AF.[6]Ntobeko and colleagues had shown 20% of the patients ofidiopathic cardiomyopathy in AF.[8] AF candecrease the heart's pumping ability by as much as 20%-25%. AF combined with a fast heart rate over a period of days to months can result in heart failure. Control of AF can improve heart failure.

LAD was present in 39.21% of the patients. In this study 29.41% patients were having LBBB. LBBB is a common finding in severe DCM and the strongest predictor of mortality.[9] LBBB causes the delayed conduction and the asynchronous contraction of the septal and lateral myocardial walls as demonstrated by echocardiography. Linder and colleagues had described heterogeneous distribution of myocardial oxygen consumption (MVO_2) and myocardial blood flow (MBF) in the myocardial wall among DCM patients with LBBB.[10]

LVH is a common finding in DCM. This study found 29.41% of the subjects were having LVH in ECG. Ntobeko and colleagues had found LVH in 35%of patients with idiopathic DCM.[8] The development of LVH appears to have a protective or beneficial role in DCM by reducing systolic wall stress and protecting against further dilatation of the left ventricle.[11,12]Iida and colleagues had shown systolic reserve, represented by the response to isoproterenol, was greater in patients with DCM with LVH in echocardiogram than in those without LVH, and a lower plasma level of norepinephrine needed to activate the myocardium during exercise in patients with DCM with LVH.[13]

ST-T changes are also common findings in DCM. In this study ST depression was present in 16 (31.37%) and T wave flattening/ inversion in 21 (41.37%) of the patients. Iida and colleagues had shown 41% of their patients of DCM were having ST segment depression and T wave flattening or inversion.[13]

V. Conclusions:

Mean age of presentation of DCM in present study was comparable to those in literature. Almost equal numbers of females were suffering from DCM as compared to male. Significant numbers of patients were mildly symptomatic during diagnosis. AF, LAD, LBBB, LVH, ST-T changes were common ECG findings in DCM patients. Since those ECG changes have different implications on the symptoms and progression of disease, those changes needs to be considered while managing them.

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