Dilated Cardiomyophthy Experience in Pakistan

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SUMMARY :

Retrospective analysis of 80 echo confirmed cases was done at NICVD. Of these 45 cases thought to be of Idiopathic Dilated Cardiomyopathy on clinical and Echocardiographic grounds were studied in detail. Dilated Cardiomyopathy constitutes a greater proportion of patients with cardiac disease than was previously recognized in Pakistan. The clinical, electrocardiographic radiological and echocardiographic profile of idiopathic Dilated Cardiomyopathy as seen in Pakistan is presented and compared with pertinent literature from around the world. The need for a thorough prospective study to clarify and characterize the various aspects of this disease entity remains.

The cardiomyopathies are a group of diseases primarily affecting the myocardium. There has been a lot of confusion about terminology and classification uptil the sixth decade of this century (1). It is defined simply as heart muscle disorder of unknown cause or association (2-7). By strict definition known disorders leading to heart muscle diseases e.g. Sarcoid, Amyloid etc. are excluded.

The first working classification which is presently accepted internationally was described by Goodwin (2) viz. Dilated Cardiomyopathy, Hypertrophic Cardiomyopathy and Restrictive/ Obliterative Cardiomyopathy (Fig.-1). Dilated (Congestive) Cardiomyopathy is characterized by dilatation and poor contraction of ventricles leading to congestive heart failure. Hemodynamically there is increased end diastolic (E.D.V.) and end systolic volumes (E.S.V.) with uniformly hypokinetic left ventricle resulting in high residual volume (Fig.-2), poor ejection fraction (E.F.) usually with increased left ventricular end-diastolic pressure (L.V.E.D.P.). The essence of the disease is failure of the heart as a pump (8).

During the last two decades increasing interest has been directed to clarifying the various aspects of Dilated Cardiomyopathy all over the world. To our knowledge, so far, very little work has been done on this disease in Pakistan (9-12). We are describing here the detailed clinical profile of the cases diagnosed at the National Institute of Cardiovascular Diseases (Pakistan) Karachi, (NICVD).

MATERIALS AND METHODS

Between January, 1979 and May, 1983, a total of 7360 Echoes were performed at the NICVD, out of which 80 cases had Echo confirmed diagnosis of Dilated Cardiomyopathy. Only 45 of these 80 cases were thought to be truly idiopathic on clinical and laboratory grounds and had complete records available and were subjected to retrospective analysis. A detailed clinical history and a complete physical examination was done in all patients. C.P. and E.S.R., Chest X-ray, P.A. view and 12 leads resting E.C.G. were recorded in all cases. Selective coronary arteriography was performed only in those cases with chest

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pain and having clinical suspicion of Coronary Heart Disease. No case had endomyocardial biopsies.

Echocardiogram was done with S.K.I. Ekoline System. A transducer of 2.25 M.Hz. frequency focussed at the depth of 10 cms was used. Patients were examined in supine and left lateral position with transducer at 3-5th left parasternal space and M-mode scan from base to apex of the heart was recorded on photosensitive paper at a speed of 50 mm/sec. The measurements were made in a standard manner (13) relying on 'leading edge' methodology (Fig.-3). Teichholz (13a) formula was used for volume calculations.

The Echo diagnosis of Dilated Cardiomyopathy was made when the following criteria (Fig.-4) were fulfilled :—

1. Dilated left ventricle.
2. Generalized reduction of L.V. wall motion.
3. Normal septal and left ventricular posterior wall thickness.
4. Normal valve appearance.

RESULTS :

Out of 80 Echo confirmed cases of Dilated Cardiomyopathy, 18 were excluded due to incomplete clinical records and technically difficult Echo study. Another 17 patients, on detail review of history, physical examination and available investigations revealed secondary etiology (Coronary Heart Disease in 14, Myocarditis in 2 and Hypertensive Heart Disease in one patient). Of the 14 cases labelled as Coronary Heart Disease, 12 patients had history of typical chest pain, documented serial E.C.G. evidence of Acute Myocardial Infraction, while 2 patients revealed significant obstruction of all three vessels on coronary arteriography. On the other hand, one patient with a clinical diagnosis of Myocardial Infarction showed normal Coronary Arteries, increased L.V.E.D.P. and diffuse hypokinesia of left ventricle on Cardiac Catheterization and Coronary Angiography. Later on he underwent Echocardiography which also suggested the diagnosis of Idiopathic Dilated Cardiomyopathy.

After exclusion from the total of 35 cases, we were left with 45 cases which were thought to be those of Idiopathic Dilated Cardiomyopathy which were subjected to detailed analysis. None of these patients had Hypertension in past, similarly the history of any infectious disease prior to the onset of heart failure or a history of Chronic Alcoholism was absent.

AGE AND SEX DISTRIBUTION

In our series of 45 patients, males out-number the females with Male/Female ratio of 35/10 (Table-I). The average age, at presentation to the NICVD was 43.7 years with a range of 12 to 65 years. Majority of patients were in the 4th to the 6th decades. Females were affected at a younger age with a mean age which was 10 years less than Males.

TABLE — 1

SEX AND AGE DISTRIBUTION

MALE/FEMALE RATIO	35/10
MEAN AGE (±S.D.)	43.7±15.3 YRS.
AGE RANGE	12 — 65 YRS.
MEAN AGE (±S.D.) OF MALES	45.9±14.2 YRS.
MEAN AGE (±S.D.) OF FEMALES	36.0±14.2 YRS.
NO. 5.	

SYMPTOMS

The duration of symptoms prior to inclusion in this study ranged from 5 days to 11 years. Symptoms in descending order of frequency were dyspnea (78%), palpitation (31%), chest pain (27%), pedal edema (20%), abdominal distention (7%), fatigue (4%) and syncope (2%). Several patients had multiple complaints.

Effort dyspnea was the most common symptom and insidious in onset. Orthopnea, while frequently reported was usually mild in severity and acute pulmonary edema was seen less often. Chest pain in majority of patients was atypical, vague, widely distributed over the chest and as a rule no relationship could be established with effort.

PHYSICAL EXAMINATION

Physical findings of raised jugular venous pressure, basal pulmonary crepitations and hepatomegaly were present in half of our patients while apical systolic murmur (38%), pitting edema over ankle (36%), S3 gallap (33%) and S4 gallop (13%) were also frequently recorded. Apical systolic murmur in all patients was soft and of low intensity. S3 and S4 gallp sounds were localized at the apex and best heard in left lateral

position. Most patients had sinus tachycardia (57.8%). Mean systolic and diastolic blood pressure was 113.3 mm Hg and 76.1 mm Hg respectively. There were only 3 patients with a diastolic B.P. greater than 90 mm Hg during heart failure but it fell below this level after control of Heart failure.

ELECTROCARDIOGRAM

All patients had abnormal electrocardiograms. Abnormalities of P, QRS complex and T waves, different arrythmias and conduction defects were noted on 12 leads resting E.C.G. and frequently using long Lead II rhythm strip. Table-II depicts their fequency. Most common finding was non specific ST and T wave changes widely distributed in limb and chest leads. Wide and notched P waves in Lead II with dominant negative deflection in lead V_1 diagnostic of left atrial enlargement was present in 16 patients. Pathological Q waves in many leads mimicking infarction pattern were seen in 10 patients and left ventricular hypertrophy by voltage criteria' was seen in 8 patients. E.C.G. pattern of right ventricular hypertrophy was abset even though clinically left parasternal lift was frequently felt. Fifteen patients showed ventricular extrasystoles (PVC's), in 6 these were frequent or originating from multiple foci and in 3 cases short runs of ventricular tachycardia were recorded. Antiarrythmic treatment was given in these latter 9 cases. We had one patient with trifascicular block, frequent PVC's and paroxysms of supraventricular tachycardia which was managed by implantation of artificial pacemaker to control block and bradycardia and oral Propranolol to control tachycardias.

Among the various intraventricular conduction defects left Bundle Branch Block (L.B.B.B.) was most common (22%). Next in frequency was left anterior hemiblock (L.A. H.B.) in 20% (left axis deviation $> -45^{o}$).

TABLE – II

E.C.G. CHANGES

ECG FINDING	NUMBER (%)
NON-SPC ST-TWC	37 (82.2)
L.A. ABNORMALITY	16 (35.6)
PATH. Q. WAVES	10 (22.2)
LVH (BY VOLTAGE)	8 (17.8)
RHV	0 (0)
(MEAN H.R.±S.D.)	97±15/MIN.)
ARRYTHMIA	**NUMBER (%)**
SINUS TACHY	26 (57.8)
PVC'S	15 (33.3)
VENT. TACHY	3 (6.7)
SVT	1 (2.2)
CONDUCTION DEFECT	**NUMBER (%)**
L.B.B.B.	10 (22.2)
L.A.H.B.	9 (20.0)
R.B.B.B.	3 (6.7)
1^{o} H.B.	2 (4.4)
TRIFASCICULAR BLOCK	2 (4.4)
BIFASCICULAR BLOCK	1 (2.2)

(NOTE: NO PATIENT HAD NORMAL ECG).

CHEST X-RAY

Only posteroanterior views were taken. Cardiomegaly was a striking feature in the majority of cases except in 4 patients with normal radiological heart size (C.T. ratio < 0.5). Mild cardiomegaly (C.T. > 0.5 to 0.6) was present in 4 patients. Moderate cardiomegaly (C.T. > 0.6 to 0.75) in 29 patients and gross cardiomegaly (C.T. > 0.75) was seen in 8 patients.

Pulmonary venous congestion ranging from visibly distended superior Pulmonary veins (upper lobe venous blood shunting) to ground glass appearance of lung fields denoting pulmonary edema were noted in 29% of cases. Full blown X-ray picture of acute severe pulmonary edema was not seen in the X-rays reviewed. Majority of patients were on antifailure treatment and responding favourably.

ECHOCARDIOGRAPHIC FEATURES

The mean values of Echo parameters in these 45 patients are given in Table-III. Aortic root dimension was within normal limits. Left atrial dimension in 20 cases was increased which is closed to the figure showing left atrial englargement on E.C.G.

All cases fulfilled the Echo criteria of Dilated Cardiomyopathy. Characteristically, there were increased end-diastolic and end-systolic dimensions of left ventricle. There was generalized reduction of the systolic amplitude of septal and left ventricular posterior wall motion. However

TABLE – III

ECHOCARDIOGRAPHIC FEATURES

ECHO PARAMETER	MEAN ± S.D. (m.ml.)	NORMAL RANGE (m.m.)
AO DIAM	28.0± 3.8	20 – 40
L.A. DIAM	42.8± 7.1	20 – 42
R.V. DIAM (D)	24.3± 5.6	7 – 25
L.V. DIAM (D)	63.9± 6.3	37 – 56
L.V. DIAM (S)	56.1± 6.4	22 – 40
I.V.S. THICKNESS (D)	9.0± 1.8	8 – 11
I.V.S. THICKNESS (S)	10.7± 2.1	
I.V.S. EXCURSION	3.5± 1.5	3 – 8
L.V.P.W. THICKNESS (D)	8.5± 1.8	7 – 12
L.V.P.W. THICKNESS (S)	11.8± 1.8	13 – 20
L.V.P.W. EXCURSION	5.7± 2.0	9 – 14
E TO IVS DISTANCE	22.3± 5.0	<– 6
E. F.	26± 3%	50 – 70%

EARLY CLOSURE OF AO. VALVE IN 20 (44.4%)
FISH MOUTI APPEARANCE IN – 45 (100%).

thickenss of septum and posterior wall of the left ventricle were within normal limits. An expected feature noted was the diminished systolic thickening of the left ventricular septal and posterior walls indicative of depressed myocardial contractility. The minimal distance between Mitral E point and most posterior position of left septal margin was markedly increased (mean = 22.3 mm) as compared to the normal which is < 6 m.m. and was further indication of severe left ventricular dysfunction and dilation. There was severe reduction of Ejection Fraction in all cases with a mean value of 26% again reflecting poor contractile function.

Early closure of aortic valve suggestive of low forward aortic flow was present in 44% of cases. "Fish Mouth" apperance of mitral valve was seen in all cases.

DISCUSSION

Dilated Cardiomyopathy represents one of the neglected heart diseases in Pakistan. The reasons for this may have been the assumption that it is a rare problem. It may also have been overlooked and mis-diagnosed for lack of interest because its treatment remains unsatisfactory. However the main reason was perhaps the fact that Echocardiography, which is the main non-invasive test for diagnosis, was not introduced in Pakistan until 1978 (9). Since then it has constituted a greater proportion of patients with cardiac disease than was previously recognized. Relative frequency of this disorder has been described for the first time by one of us (9) while reporting the experience of the first year of Echo in Pakistan.

Our criteria of case selection was based on scrutiny of historical information and eliminating secondary causes from complete physical examination, routine laboratory investigations, E.C.G., and X-ray Chest before labelling our patients as idiopathic dilated Cardiomyopathy. Coronary arteriography to exclude ischemic cardiomyopathy was done only in few cases presenting with chest pain, infarction pattern on E.C.G. and echocardiogram with localized wall motion abnormality. No endomyocardial biopsies were performed mainly due to lack of specialized pathological facilities to process the tiny specimens. However, myocardial biopsy plays an important role in excluding acute myocarditis where steroids have a role and in diagnosing non-systemic infliterative disorders such as Amyloidosis, Sarcoidosis, Haemochromatosis (7) about whose incidence there is no data in our country. Even old technique of open biopsy for diagnostic purpose, has been justified by some workers in past (14). But with recent improvements in technique, the role of endomyocardial biopsy in diagnosis, natural history and research on Dilated cardiomyopathy is being established (15, 16, 17).

Our series shows a male preponderance affecting the middle aged population. Majority of the patients have onset of symptoms between fourth and sixth decades, an experience which is in agreement with that described by others (18-21).

The usual clinical picture of insidious onset of biventricular or predominant right or left ventricular failure with low cardiac output and narrow pulse pressure seen locally is similar to that classically presented in the other parts of the world (22-26). Chest pain which was present in 26% of our patients is essentially nonspecific in nature. Typical chest pain can however occur infrequently. The pericardium and pleura have been incriminated as commonly causing pain (6, 20, 25).

Auscultatory findings of faint apical systolic murmur (upto grade 2/6) and gallop rhythm (S3 and less commonly S4) were frequently found. According to Goodwin (27) the systolic murmur is due to dilation of mitral ring and

dysfunction of papillary muscle which tends to wane with clinical improvement and wax with deterioration, in contrast to Rheumatic Mitral regurgitation. In the presence of tachycardia a loud summation gallp may lead to the erroneous diagnosis of Mitral stenosis as reported by Kline and Saphir (28). Various reasons have been described in literature for these interesting auscultatory findings (29).

E.C.G. was abnormal in all patients and there is no diagnostic pattern characteristic of the disease with the exception of Evans description (30) of peculiar T waves in Alcoholic Cardiomyopathy. The most common features were widespread non-specific ST and T wave changes suggestive of diffuse myocardial involvement (22).

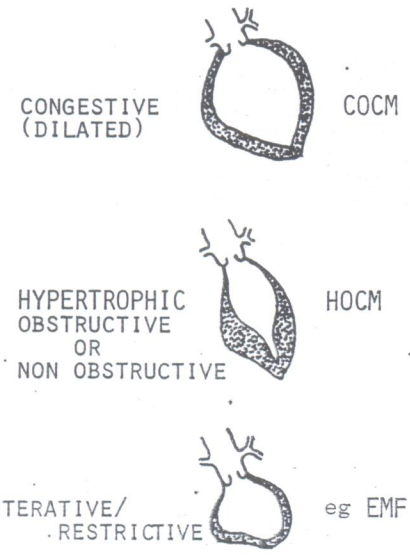

FIGURE- 1. CLASSIFICATION OF CARDIOMYOPATHY.

Except for the absence of atrial fibrillation in our study the E.C.G. findings tally closely with other reports (20, 24, 26). Frequency of various rhythm and conduction disturbances reported by us is based on 12 leads resting E.C.G. and rhythm strip tracing which is definitely an under estimation as continuous 24 hours Holter monitoring was not undertaken.

An aspect of unusual interest in the E.C.G. was the presence of Q waves in 22% of patients. This was seen commonly in chest leads, a finding also mentioned by many opposite situation is also reported where coronary heart disease was labelled as Dilated Cardiomyopathy (33) proving the non-specificity of E.C.G. True genesis of Q

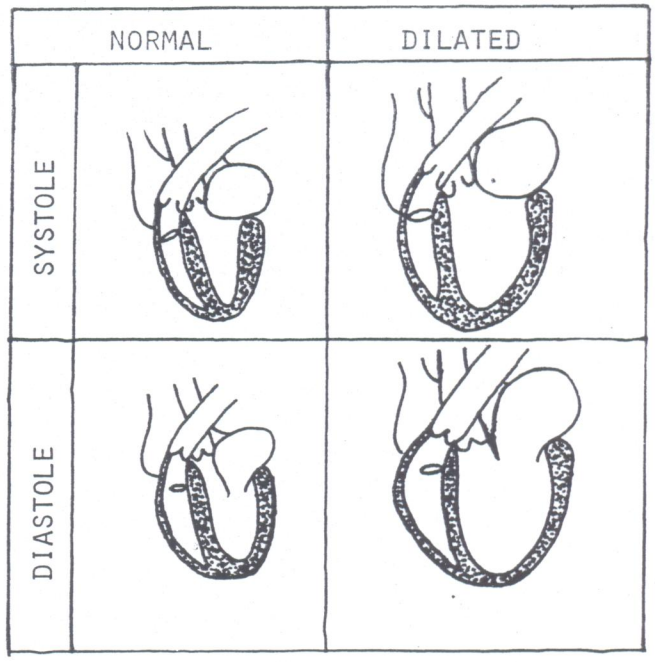

FIGURE – 2.

Diagram of the 50° left anterior oblique view of the heart in dilated cardiomyopathy compared with normal heart during end systole and end diastole.

waves pattern in Dilated Cardiomyopathy remains unknown but possibly severely affected areas might act like "electrical windows" (32) and multiple areas of fibrosis could alter intraventricular conduction with loss of positive vector forces especially in chest leads (2).

Radiologic features were characteristic but not diagnostic and in general correlate with the experience of others (22-26). The most common finding seen by us was significant cardiomegaly (C.T. ratio > 0.6) in 82% of cases. Radiological evidence of cardiomegaly sometimes identify presymptomatic individuals (7,34) and heart size is one of the best indicator of prognosis in Dilated Cardiomyopathy (35). During follow-up of patients, serial X-ray films showing gradual increase in heart size denote poor prognosis.

It is important to note that in this selected group of patients only 40% had pre-echo diagnosis of Dilated Cardiomyopathy and 35% were labelled as coronary heart disease. The reason for this being that many of these cases had chest pain and Q waves on E.C.G. Careful attention to clinical history and Echo features (especially 2-D Echo) helps prevent this. There may be some difficult cases with atypical presentation where coronary arteriography is needed for exact diag-

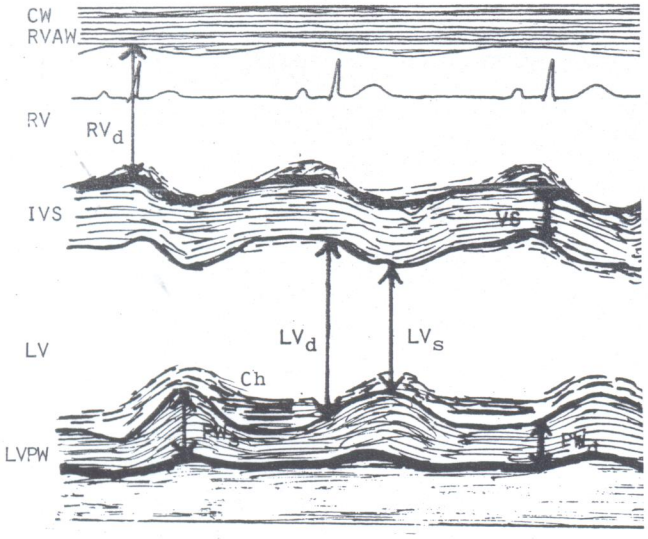

FIGURE – 3.

A normal M-Mode Echocardiogram at the level of the Chordae tendinae (Ch) demonstrates the level at which septal thickness (VS), posterior wall thickness at systole (PWs) and end diastole (PWd), left ventricular internal dimensions at end diastole (LVd) and end systole (LVs) and right ventricular internal dimensions at end diastole (RVd) were measured.

nosis (32). However, ideally for research purposes all cases should have cardiac catheterization and coronary angiography.

During the preceeding few years the importance of Echocardiography has been established in recognition and categorization of Cardiomyopathies (36). Its value is evident not only as a non-invasive diagnostic tool but also useful in excluding other conditions which clinically simulate Dilated Cardiomyopathy e.g. occult valvular or congenital heart disease, coronary heart disease and pericardial effusion (39.40.41). Our Echo parameters (Table-III) resemble the reports from other countries (39). The Echo parameters have been repreatedly validated by cardiac catheterization and angiography and during surgery and autopsy (37,38,42) and signifies the high sensitivity of Echocardiogram in assessing the L.V. functions. The typical "Fish-mouth" appearance of Mitral Valve was seen in all cases. This is due to ventricular dilatation, low mitral valve flow of blood and elevated L.V.E.D.P. causing this abnormal appearance of the mitral leaflets (43,44).

Nearly all patients examined by us showed marked reduction of Ejection Fraction (mean =26%) which is indicative of poor systolic function. E.F. and left ventricular cavity size have reliable prognostic correlations (2,7,45,46).

Our own experience is too short for meaningful analysis of natural history and prognosis which has been well documented by others (6,15,34,47). In general patients during early stages of the disease respond favourably with usual antifailure regimen of bed rest, diuretics, digitalis, etc., (48,49). However, the use of new inotropic agents like Dopamine, Dobutamine (50), selective beta$_2$ agonist (51), vasodilators alone (52) or in combination with inotropic agents (53) are recent advancements of therapeutic research. But the usual course of disease is downhill, progressing through repeated episodes of myocardial failure, culminating in advanced congested circulatory state of heart failure refractory to treatment and death. In our own experience the worse prognosis has been in the post partum cardiomyopathy cases admitted in pulmonary edema. Most of these cases did not survive.

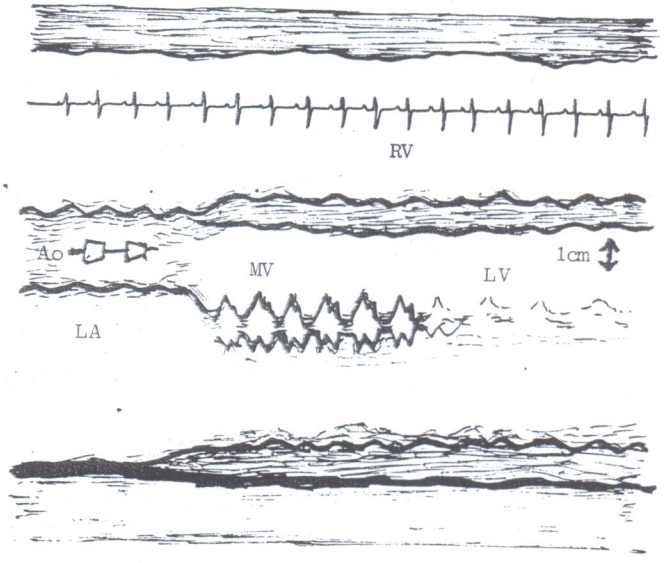

FIGURE – 4.

Echocardiogram illustrating congestive cardiomyopathy. The left atrium (LA) is increased in size. The left ventricular cavity (LV) is markedly dilated with decreased septal and posterior wall motion. The mitral valve has "fish mouth" appearance and a marked increase in the distance between the anterior leaflet and ventricular septum.

The importance of Dilated Cardiomyopathy lies in the fact that it is a frequent cardiological problem usually mislabelled under various names most commonly as coronary heart disease. It is, therefore recommended that a detailed prospec-

tive study is done preferably with all cases undergoing cardiac catheterization and coronary angiography, endomyocardial biopsies, and, autopsy where possible, to further characterize this disease entity in Pakistan with the ultimate hope that curative treatment will follow.

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