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A STUDY OF LEFT VENTRICULAR FUNCTION IN CHRONIC RENAL FAILURE PATIENTS ON MAINTENANCE HEMODIALYSIS

Medicine

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ABSTRACT

Cardiac diseases are the leading causes of morbidity and mortality in patients with chronic renal failure. This increased risk of Cardiac Disease may begin during early stage of chronic renal failure. Factors like pressure overload, volume overload, anaemia, uremic toxins, oxidative stress contribute to the development of cardiac diseases in chronic renal failure. Spectrum of cardiac diseases in chronic renal failure patients includes Left ventricular hypertrophy, systolic and diastolic dysfunction, ischaemic heart disease and dilated cardiomyopathy which can be identified from 2D echocardiography. Sudden cardiac death can occur in chronic renal failure patients with underlying cardiac disorders**.**

Methodology: A one year cross sectional study was conducted in the Guru Gobind Singh Hospital, Jamnagar. 50 patients of END STAGE RENAL DISEASE on Maintenance Haemodialysis fulfilling the inclusion criteria were included in the study.

RESULTS: In our study, out of 50 ESRD patients, diastolic dysfunction was seen in 42 (84%) patients, LVH seen in 21 (42%) patients, systolic dysfunction in 17 (34%) patients, dilated cardiomyopathy in 14 (28%) patients and pericardial effusion in 4 (8%) patients, indicating that diastolic dysfunction was the most common finding observed on 2d Echo and LVH was the most common structural cardiac disease among ESRD patients.

KEYWORDS

Cardiac diseases, 2D Echo, END STAGE RENAL DISEASE (ESRD), Maintenance Haemodialysis.

INTRODUCTION

Cardiac diseases are the leading causes of morbidity and mortality in patients with chronic renal failure. This increased risk of Cardiac Disease may begin during early stage of chronic renal failure. Spectrum of cardiac diseases in chronic renal failure patients includes Left ventricular hypertrophy, systolic and diastolic dysfunction, ischaemic heart disease and dilated cardiomyopathy. Pressure overload due to hypertension, volume overload due to anemia initially leads to LVH, LV systolic dysfunction. Myocardial fibrosis also occur which leads to diastolic dysfunction. Uremic overload leads to accumulation of hypertrophic substances like endogenous cardiotonic steroids(Marinobufagenin) in cardiac myocytes. All these factors finally leads to the development of dilatation of heart. Anemia is the most common associated condition with Chronic Renal Failure which further detoriates the cardiac condition of the patient Hemodialysis is one form of renal replacement therapy, which helps in attenuation of uremia, correction of hypervolemia, controlling hypertension, correction of anemia, achieving hydro-electrolyte balance, also maintains the nutritional status and physical well being if done on a regular basis, which leads to the improvement of cardiac function of the patient.

In this study, we evaluated the cardiovascular abnormalities by performing 2D-echocardiography in patients with CKD on maintenance hemodialysis (MHD).

AIMS AND OBJECTIVES:

1. To carry out clinical and echocardiographic evaluation of left ventricular function in chronic renal failure patients on maintenance hemodialysis,
2. To study the prevalence of left ventricular dysfunction in patients with chronic renal failure on maintenance hemodialysis.

MATERIALS AND METHODS:

This is a one year observational cross sectional study conducted in the Guru Gobind Singh Hospital, Jamnagar.

50 ESRD patients irrespective of underlying etiology who were coming to the Hemodialysis unit in the Guru Gobind Singh Hospital, Jamnagar were included in this study. A person was labelled ESRD if his or her GFR was less than 15ml/min/1.7m2 as per modified diet in renal disease (MDRD) formula and who were on MHD. Patient with obvious clinical evidence of coronary artery disease, valvular heart disease, pericardial effusion, rheumatic heart disease, congenital heart disease and primary cardiomyopathy were excluded from the study.

Informed consent was taken from all subjects participating in the study. Systolic and diastolic blood pressure of all subjects were recorded, then underwent various investigations like haemoglobin, S. creatinine, S. urea. During the inter - dialytic period all patients underwent 2dimensional directed M mode echocardiography performed on Hewlett Packard SIM 7000, in left lateral decubitus position by a consultant physician experienced in echocardiography.

To estimate **LVDD** and **LVDS**: M mode recording perpendicular to the long axis of the left ventricle and through the centre of the left ventricle at the papillary muscle level was taken as the standard measure of systolic and diastolic wall thickness and chamber dimensions.

The **Left Ventricular Ejection Fraction** (LVEF) was taken as measure of LV systolic function.

LVEF was determined using Teichholz method.

LVEF <55% was considered as **Systolic Dysfunction**. **Diastolic dysfunction** was determined by measuring the E/A ratio by special Doppler inflow velocity (E is peak early diastole velocity and A is peak atrial filling velocity of left ventricle across mitral valve). E/A ratio less than 0.75 and more than 1.8 was considered as diastolic dysfunction.

LVH was diagnosed when inter ventricular septum thickness or left ventricular posterior wall thickness was > 12 mm.

Left ventricular dilatation with LVDD >55 mm in females and LVDD >60mm in males along with dilated right ventricle, dilated right atrium and LVEF <45% was considered for diagnosing **Dilated Cardiomyopathy**.

Anaemia was diagnosed with Hb< 13g/dl in males and Hb< 12g/dl in females. Severe anaemia with Hb<10g/dl.

Statistical analysis was done by using chi square test by Statistic calculator software version 4.8.1. A 'p value' less than 0.05 was considered significant.

RESULTS:
Out of 50 ESRD patients 38 (76%) were male and 12 (24%) were female. Mean age of the patients was 52.5 ± 10.5 years. Echo-cardiographic findings were studied and analyzed in details.

Table-1:Prevalence Of Cardiac Abnormalities In ESRD Patients On MHD

Cardiac abnormality	No.of patients	%
Diastolic Dysfunction	42	84%
LVH	21	42%
Systolic Dysfunction (EF<55%)	17	34%
Dilated Cardiomyopathy	14	28%
Pericardial Effusion	4	8%

All 50 patients were anemic and 31 (62%) patients were severely anemic (Hb<10%). Among 21 LVH patients 15 (72%) patients were severely anemic and all 14 (100%) dilated cardiomyopathic patients were severely anemic, showing a statistically significant association between severity of anemia and LVH and Dilated Cardiomyopathy in ESRD patients.

DISCUSSION:
In our study, diastolic dysfunction was seen in 42 (84%) patients, LVH seen in 21 (42%) patients, systolic dysfunction in 17 (34%) patients, dilated cardiomyopathy in 14 (28%) patients and pericardial effusion in 4 (8%) patients.

Table-2: Prevalence Of Lvh In Ckd

	% of patients with LVH
Present study	42%
Dhamija JP, et. al.	48%
Laddha M, et. al.	74%

Table-3: Prevalence Of Diastolic Dysfunction

	% of patients with Diastolic Dysfunction
Present study	84%
Dhamija JP, et. al.	51.4%
Agarwal S, et. al.	53.2%
Laddha M, et. al.	61.4%

Table-4: Prevalence Of Systolic Dysfunction

	% of patients with Systolic Dysfunction
Present study	34%
Dhamija JP, et. al.	28%
Agarwal S, et. al.	30%
Laddha M, et. al.	24.3%

In the present study, prevalence of Pericardial Effusion was found to be 8%. Dhamija JP, et al and Laddha M, et al studies have found it to be 17% and 14% respectively.

In context of Dilated Cardiomyopathy in CKD, no study was found for comparison, but in our present study we found Dilated Cardiomyopathy in 28% of patients of ESRD.

All 50 patients were Anemic and 31 (62%) patients were severely anemic (Hb<10%). Among 21 LVH patients 15 (72%) patients were severely anemic and all 14 (100%) dilated cardiomyopathic patients were severely anemic, showing a statistically significant association between severity of anemia and LVH and Dilated Cardiomyopathy in ESRD patients. Datta, et al had observed severity of anemia correlated to LVH in patients with CKD.

CONCLUSION:
Structural as well as functional cardiac abnormalities are common in ESRD patients. Order of incidence of cardiac abnormalities in ESRD patients is as follows,

Diastolic Dysfunction > LVH > Systolic Dysfunction > DCM > Pericardial Effusion.
LVH is the commonest structural cardiac abnormality and this high prevalence of Left ventricular hypertrophy on echocardiography implies that these patients require detailed cardiovascular evaluation despite absence of symptoms, and also require various efforts aimed at prevention and control of further cardiac complications, which should be started early during the course of renal insufficiency.

Diastolic Dysfunction is the most common cardiac abnormality and it is present even before and in the absence of LVH.

Anemia significantly increases the risk of development and progression of LVH and DCM.

Echocardiographic evaluation of Chronic Renal Failure patients is important for risk stratification and early preventive measures. Thus, echocardiographic screening of asymptomatic ESRD patients help us to check progress and prognosis of the disease.

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