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Early Detection Of Cardiac Abnormalities In Chronic Kidney Disease Utilising Echocardiography At Government General Hospital, Vijayawada

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Abstract
Background: *cardiovascular disease is emerging as the most common cause of death in patients with end stage renal disease. The age adjusted cardiovascular complications and mortality is about 30 times higher in end stage renal disease than in general population. Angina pectoris, myocardial infarction, dysrhythmia, cardiac failure, stroke and peripheral vascular disease are common in end stage renal disease. Cardiomyopathy, whether clinically silent or not, is an independent predictor of cardiac morbidity and mortality. An early detection of cardiovascular abnormalities in chronic kidney disease enables prevention, early diagnosis and prompt interventions to control the complications. This study done at siddhartha medical college, vijayawada identifies the cardiovascular changes and complications found in patients with chronic kidney disease.*
Materials and methods: *the study was conducted in non-diabetic and non-hypertensive patients with chronic kidney disease admitted in siddhartha medical college hospital during the period january 2023 to december 2023.*
Results: *our study included 54 patients with ckd, upon performing echocardiography, pericardial effusion is seen in 46.3%, concentric lvh in 44.4%, dilated lv in 25.9%, diastolic dysfunction in 27.8% and systolic dysfunction in 20.4%. Echocardiographically detectable mild pericardial effusion and concentric left ventricular hypertrophy were present in asymptomatic patients. Hence this necessitates screening of patients without cardiac symptoms for cardiac abnormalities immediately after the diagnosis of chronic kidney disease has been made.*

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I. Introduction

Patients with chronic kidney disease (CKD) exhibit an elevated cardiovascular risk manifesting as coronary artery disease, heart failure, arrhythmias, and sudden cardiac death. Although the incidence and prevalence of cardiovascular events is already significantly higher in patients with early CKD stages (CKD stages 1–3) compared with the general population, patients with advanced CKD stages (CKD stages 4–5) exhibit a markedly elevated risk. Cardiovascular disease is the leading cause of death in this high-risk population rather than other complications of end-stage kidney disease (CKD stage 5).

Richard Bright, a British physician, was the first to report the association of chronic kidney disease (CKD) with cardiovascular disease (CVD).Patients with CKD exhibit a pronounced risk for cardiovascular events: 50% of all patients with CKD stage 4 to 5 have CVD, and cardiovascular mortality accounts for ≈40% to 50% of all deaths in patients with advanced CKD.

Traditional and mutual risk factors between CVD and CKD are age, hypertension, diabetes mellitus, dyslipidaemia, tobacco use, family history and male gender. High blood pressure, glucose, and lipid levels, as well as tobacco use can aggressively be modified. However, toxic metabolites produced by uraemia in chronic kidney disease as well as conditions that alter the metabolism of chemical elements, such as calcium and phosphorus, account for the excess CVD in patients with CKD, and are known as non-traditional risk factors.

Left Ventricular hypertrophy (LVH) is highly prevalent in Chronic Kidney Disease (CKD) and is associated with a clearly unfavourable prognosis. The incidence of Left Ventricular Hypertrophy increases with a progressive decline in renal function. Two main mechanisms are considered to contribute to LVH in CKD are increased (1) afterload and (2) preload. Afterload is increased due to abnormal arterial stiffness, increased systemic arterial resistance, and systolic hypertension, leading to an initial concentric LVH. Continuous left ventricular overload subsequently leads to maladaptive changes and cardio-myocyte death, that in turn results in an eccentric hypertrophy and subsequent left ventricular dilatation, systolic dysfunction, and reduced ejection fraction (EF). Preload is increased due to the expansion of intravascular volume in CKD leading to volume overload, length extension of myocardial cells, and eccentric or asymmetrical left ventricular remodelling .

Cardiac fibrosis in patients with CKD is characterized by diffuse collagen deposition between capillaries and cardiomyocytes funnelling into the maladaptive ventricular hypertrophy with subsequent dilatation of the heart.

Left Ventricular systolic dysfunction is a powerful indicator of un-favourable prognosis in patients on Haemodialysis. Diastolic dysfunction is characterized by alteration in ventricular relaxation and compliance, frequently followed by a compensatory increase in filling pressure in more advanced stages, finally leading to heart failure.

Echocardiogram allows for the evaluation of ventricular mass and volume, and detects hypertrophy (concentric or eccentric) and systolic function. In addition, Doppler helps in understanding dynamics of ventricular relaxation and filling, as well as the presence of abnormalities in the cardiac valves and the pericardium.

II. Materials And Methods

The study was conducted in patients with chronic kidney disease admitted in Siddhartha Medical College Hospital during the period January 2023 to December 2023 in the Department of Medicine, Government General Hospital, Vijayawada.

Study Design: Observational study.
Study Location: Government General Hospital, Vijayawada, Andhra Pradesh.
Study Duration: January 2023 to December 2023.
Sample Size: 54 CKD patients who were fulfilling the inclusion and exclusion criteria were studied

Inclusion Criteria:
The following criteria were used in selection of cases:
1) Patients who were known chronic kidney disease patients.
2) Patients who were symptomatic for 3 months or more.
3) Patients with serum creatinine more than 3 mg% and creatinine clearance < 30 ml/min.
4) Patients with abdominal ultra-sonogram showing poor cortico-medullary differentiation and grade 2 & grade3 parenchymal changes.

Exclusion Criteria
1) Patients who were known valvular heart disease, coronary heart disease, diabetes mellitus, etc...
2) Patients who were known hypertensive for years before the onset of chronic kidney disease.
3) Patients who underwent dialysis after admission.
4) Patients above 50 years of age.
5) Patients who were alcoholics.

Data Analysis

For data analysis, latest NCSS software version was used. The mean and standard deviation are displayed as the outcomes of the parametric quantitative data. P-values<0.05 are regarded as significant.

III. Discussion

The study included a total of 54 patients. Of these 54 patients, 40(74%) were males and 14 (26%) were females. The age of the patients varied from 13 to 48 years, with majority of patients falling within 31 to 40 years group. The mean age was 30 years, with mean age in males being 31years and in females being 26 years. The duration of symptoms varied from 3 months to 3 years. 13(24.1%) patients had duration less than 6 months. 22(40.7%) patients had duration from 6 months to 1 year. Rest of the patients had duration more than 1 year.

Easy fatigability was the most common symptom which was present in all the patients. The next common symptom was pedal oedema. It was present in 50 patients. Dyspnoea on exertion was present in 38 patients.

Dyspnoea may be due to anaemia, volume overload or pulmonary congestion due to failing left ventricle. Chest pain was found in 10 patients. Of these 10 patients 7 were found to have concentric hypertrophy and rest 3 had dilated left ventricle. The cause of chest pain in concentric LVH group could be due to increased demand by the hypertrophied muscle mass or constriction of the smaller coronary vessels by the muscular contraction during systole. Chest pain can also be due to pericarditis, in which the pain is more on lying down posture and alleviated by sitting up and leaning forward. History of palpitation was obtained from 7 patients.

JVP was normal in 35 patients and elevated in 19 patients. The patients with elevated JVP showed other features of volume overload like facial puffiness, ascites etc. Almost all patients had high blood pressure. The mean systolic BP was 152 mm of Hg and the mean diastolic BP was around 94 mm of Hg. About 39% of patients had moderate hypertension. One patient had severe hypertension. All the patients were receiving antihypertensives after admission during the study. Examination of Cardiovascular System revealed the following findings.2 patients had apical impulse shifted down and out. 2 patients had pansystolic murmur in mitral area. 5 patients had ejection systolic murmur in the aortic area. Only 1 patient had pericardial rub. 2 patients had muffled heart sounds. Rest of the patients had normal cardiovascular findings on clinical examination.

About 94.5% had serum Creatinine more than 5 mg/dl. About 68.5% had stage 5 chronic kidney disease (Creatinine clearance < 15 ml/min). Normal chest X-Ray finding was present in 72.3%. ECG revealed LVH with pressure overload pattern in 18.5%. Low voltage complexes was seen in 3.7%. Echocardiography - pericardial effusion (46.3%) and concentric LVH (44.4%) were the common abnormalities. Dilated LV occurred in 25.9%, diastolic dysfunction in 27.8% and systolic dysfunction in 20.4%.

IV. Conclusion

1. Echocardiography is easily performed, non-invasive, safe, reproducible and accurate in assessment of cardiac function in chronic kidney disease.
2. Pericardial effusion followed by concentric left ventricular hypertrophy were the commonest abnormalities in chronic kidney disease.
3. In Echocardiography, pericardial effusion occurred in 46.3%, concentric LVH in 44.4%, dilated LV in 25.9%, diastolic dysfunction in 27.8% and systolic dysfunction in 20.4%.
4. Echocardiography is more sensitive in diagnosing pericardial effusion and left ventricular hypertrophy than by X-Ray and ECG.
5. Echocardiographically detectable mild pericardial effusion and concentric left ventricular hypertrophy were present in asymptomatic patients. Hence this necessitates screening of patients without cardiac symptoms for cardiac abnormalities immediately after the diagnosis of chronic kidney disease has been made.

References:

[1] Bright R. Cases And Observations, Illustrative Of Renal Disease, Accompanied With The Secretion Of Albuminous Urine. **Guy's Hosp Trans**. 1836:338–379.

[2] Cardiovascular Disease In Chronic Kidney Disease Pathophysiological Insights And Therapeutic Options Joachim Jankowski Et Al, Aha -Circulation. 2021;143:1157–1172

[3] Iosr Journal Of Dental And Medical Sciences (Iosr-Jdms) E-Issn: 2279-0853, P-Issn: 2279-0861.Volume 21, Issue 1 Ser.5 (January. 2022), Pp 51-84

[4] Level Of Kidney Function As A Risk Factor For Atherosclerotic Cardiovascular Outcomes In The Community. Manjunath G, Tighiouart H, Ibrahim H, Et Al. J Am Coll Cardiol. 2003;41:47–55.

[5] Levin A, Thompson Cr, Ethier J Et Al. Left Ventricular Mass Index Increase In Early Renal Disease: Impact Of Decline In Hemoglobin. Am J Kidney Dis 1999;34(1):125-34.

[6] Cardiovascular Risk Factors In Ckd Associate With Both Esrd And Mortality. Muntner P, Judd Se, Gao L, Et Al. J Am Soc Nephrol. 2013;24:1159–1165.

[7] Stevens Pe, O'donoghue Dj, De Lusignan S, Van Vlymen J, Klebe B, Middleton R, Hague N, New J, Farmer Ck. Chronic Kidney Disease Management In The United Kingdom: Neoerica Project Results. Kidney Int. 2007;72:92–99. Doi: 10.1038/Sj.Ki.5002273

[8] Outcome And Risk Factors For Left Ventricular Disorders In Chronic Uraemia. Parfrey Ps, Foley Rn, Harnett Jd, Kent Gm, Murray Dc, Barre Pe. Nephrol Dial Transplant. 1996;11:1277–1285.

[9] Echocardiographic Assessment Of Cardiac Dysfunction In Patients Of Chronic Renal Failure. Agarwal S, Dangri P, Kalra Op, Rajpal S. Http://Medind.Nic.In/Jac/T03/I4/Jact03i4p296.Pdf J Indian Acad Clin Med. 2003;4:296–303.

[10] Renal Insufficiency And Heart Failure: Prognostic And Therapeutic Implications From A Prospective Cohort Study. Mcalister Fa, Ezekowitz J, Tonelli M, Armstrong Pw. Circulation. 2004;109:1004–1009.

[11] Foley Rn, Parfrey Ps, Sarnak Mj. Clinical Epidemiology Of Cardiovascular Disease In Chronic Renal Disease. Am J Kidney Dis. 1998;325 Suppl 3s112–S119. Doi: 10.1053/Ajkd.1998.V32.Pm9820470

[12] Association Between Renal Function And Cardiovascular Structure And Function In Heart Failure With Preserved Ejection Fraction. Gori M, Senni M, Gupta Dk, Et Al. Eur Heart J. 2014;35:3442–3451.

[13] Comparative Study Of The Effect Of High-Flux Versus Low-Flux Dialysis Membranes On Metabolic Abnormalities In Chronic Hemodialysis Patients. El Arbagy Ar, Koura Ma, El Barbary Hs, Abou El Nasr Ae. Menoufia Med J. 2014;27:677–682.

[14] Left Ventricular Function In Patients With Chronic Kidney Disease Evaluated By Colour Tissue Doppler Velocity Imaging. Hayashi Sy, Rohani M, Lindholm B, Et Al. Nephrol Dial Transplant. 2005;21:125–132.

[15] Echocardiographic Parameters During Long And Short Interdialytic Intervals In Hemodialysis Patients. Tsilonis K, Sarafidis Pa, Kamperidis V, Et Al. Am J Kidney Dis. 2016;68:772–781.