

Original Research Article

Assessment of left ventricular function in ischemic stroke in GDMCH Dharmapuri

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	International Archives of Integrated Medicine, Vol. 4, Issue 6, June, 2017.	
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	Available online at http://iaimjournal.com/	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 19-05-2017	Accepted on: 24-05-2017
	Source of support: Nil	Conflict of interest: None declared.
How to cite this article: P. Sasikumar, P. S. Rani. Assessment of left ventricular function in ischemic stroke in GDMCH Dharmapuri. IAIM, 2017; 4(6): 64-70.		

Abstract

Introduction: Cardiac disease is a major risk factor for stroke, ranking third after age and hypertension. Congestive Cardiac failure ranks second in cardiogenic stroke risk. The prevalence of cardiac failure increases substantially in prevalence as the population ages. Cardiac failure is also associated with high mortality, with a 15 year total mortality rate estimated at 39% for women and 72% for men. LVSD is common and treatable, accounting for 8% of people aged 25-75 years and 12% of 45-75 years. Of the 8%, 4% are asymptomatic. The patients who appear to be at high risk of LVSD are those with ischaemic heart disease, hypertension or diabetes, and smokers.

Aim of the study: Assessment of Left Ventricular Function in Ischaemic Stroke Patients.

Materials and methods: LV function was assessed by Trans thoracic 2 - dimensional echo cardiography in patients admitted with ischaemic stroke under various medical units of our government hospital.

Results: 142 Patients of the study group were divided into various sub groups. Ischaemic stroke was most commonly observed between 51-60 years of age followed by patients aged 61-70 years. The mean age of the patients was 58 years. All of these patients were men. Out of 94 men, 73 patients were chronic smokers (51%). The mean age of the smokers was 54 years. Associated history of chronic alcohol intake was seen in 33 male patients. Associated hypertension was seen in 11 patients who had statistical significance (P- value .00). Coexisting diabetes mellitus was observed in 8 patients. This correlation had a statistical significance (P- value .01) Prior history of coronary artery disease was obtained in 6 patients. This was not statistically significant. Hypercholesterolemia was noticed in 42 patients. Past history of stroke was present in 25 patients. History of shortness of breath of varying degree suggestive of left heart failure was observed in 20 patients.

Conclusion: LVSD was observed in 30 patients of the present study (21.13%). Diastolic dysfunction was observed among 12 patients (3.4%). Association of LVSD with clinical severity and extent of the

stroke had of positive correlation statistically. Association of LVSD with in hospital stay mortality was not significant. Hypercholesterolemia was observed as the most common risk factor among the ischaemic stroke patients. Coexisting coronary artery disease and diabetes mellitus had positive correlation with left ventricular systolic dysfunction.

Key words

Left Ventricular Function, Stroke, Dyslipidemia.

Introduction

Cardiac failure is also associated with high mortality, with a 15 year total mortality rate estimated at 39% for women and 72% for men³. LVSD is common and treatable, accounting for 8% of people aged 25-75 years and 12% of 45-75 years. Of the 8%, 4% are asymptomatic. The patients who appear to be at high risk of LVSD are those with ischaemic heart disease, hypertension or diabetes, and smokers [1]. However, echocardiographic screening of all hypertensive, all diabetics and all smokers for LVSD would be a daunting and costly process. A more cost-effective approach might be to wait for the first presentation of a vascular episode, and to perform routine echo screening at that time [2]. The first vascular episode could be either a myocardial infarction (MI), a transient ischaemic attack (TIA), a cerebrovascular accident or peripheral vascular disease. In normal clinical practice, MI patients are now days screened for LVSD during their hospital admission, but, patients who have had CVA/TIA/PVD are not routinely screened for LVSD. Yet, the presentation with one vascular episode in the form of stroke could be a golden opportunity to detect and treat LVSD, and thereby reduce the subsequent incidence of overt heart failure, and perhaps even sudden cardiac death [3]. We are aware that LVDD is also a major risk factor contributing towards mortality especially in hypertensive and elders. It is in this context, I have tried to assess LV function in patients who presented with atherothrombotic stroke. Hypertension is calculated to be a factor in 70% of strokes and among survivors; it identifies a patient as having an increased risk of a second event¹⁸⁻²¹ [4]. The risk of stroke increases 10-12 times if diastolic blood pressure

is 105mm Hg in comparison to a normal diastolic blood pressure of approximately 76mm Hg⁸. Overall, arterial hypertension increases the likelihood of stroke [5]. The risk rises rapidly with higher levels of blood pressure. The impact of an increase in diastolic blood pressure is much greater in young adults than in the elderly [6]. Although elevated diastolic blood pressure is a usual marker for hypertension, isolated systolic hypertension also predicts stroke in elderly persons. Isolated systolic hypertension also is correlated with increased thickness and plaque formation of the internal carotid artery. Both elevated diastolic and systolic blood pressure are associated with increased concentrations of haemoglobin, which is a risk factor for ischemic stroke [7].

Materials and methods

Randomised prospective observational study was done in Medical wards of Government Dharmapuri Medical College Hospital, Dharmapuri. Totally 142 patients diagnosed as ischaemic stroke from the period of September 2016 to March 2017 were included. LV function was assessed by Transthoracic 2 - dimensional echo cardiographs in patients admitted with ischaemic stroke under various medical units of our government hospital.

Exclusion criteria

Patients under the age of 39 years were excluded from the study group. Patients with haemorrhagic stroke were excluded from the study group. Patients with valvular heart disease were excluded from the study group.

All the study group patients underwent transthoracic echocardiography as a part of the

study. All patients had a thorough clinical, neurological examination with careful evaluation of history. Importance was given to symptoms and signs of cardiac disease in addition to neurological findings. Routine laboratory tests included urine analysis, complete blood counts, serum electrolytes, and blood glucose and serum cholesterol determination. Arterial hypertension was defined as presence of a positive history of antihypertensive treatment or blood pressure values $>140/90$ mmHg on admission. Hypercholesterolemia was defined as a total serum cholesterol >240 mg /dl. or presence of appropriate drug treatment earlier. Diabetes mellitus was defined based on abnormal fasting glucose >125 mg /dl, positive history or presence of oral hypoglycemic agents intake or insulin treatment. Coronary artery disease included history of myocardial infarction or typical angina or the patients reporting of a positive diagnostic test (stress test, Coronary angiography) or drug treatment, 12 lead ECG and CXR were taken for all the patients. The neurological work up included head CT and the patients showing haemorrhage on the CT were excluded from the study group.

Results

Most of the patients were men (66%) as against women (34%). Smoking was one of the most common risk factor observed in 73 patients. All of these patients were men. Out of 94 men, 73 patients were chronic smokers (51%). The mean age of the smokers was 54 years. Associated history of chronic alcohol intake was seen in 33 male patients. Associated hypertension was seen in 11 patients who had statistical significance (P-value .00). Coexisting diabetes mellitus was observed in 8 patients. This correlation had a statistical significance (P- value .01) Prior history of coronary artery disease was obtained in 6 patients. This was not statistically significant. Hypercholesterolemia was noticed in 42 patients. Past history of stroke was present in 25 patients. History of shortness of breath of varying degree suggestive of left heart failure was observed in 20 patients. History of angina and palpitation

was observed in 13 patients. There is no statistical significance associated with the heart failure symptoms among the smokers. 33 of the 73 patients had ECG changes of varying degree out of which 12 patients had ECG changes suggestive of left ventricular hypertrophy. 7 patients had ECG Changes of previous of myocardial infarction. 13 patients showed changes in the chest x- ray. 8 patients had cardiomegaly in the chest x- ray. Echocardiographically LVH was evident in 34 patients. E diastolic dysfunction was present in 5 patients. Clinical picture of stroke was severe in smokers associated with altered mentation, dense hemiplegia and massive infarct on the C.T. This association had statistical significance (P= value .00). In hospital mortality was observed in 3 patients. Alcohol intake was observed in 33 of the 94 men (23%). All of them were men. They had associated history of chronic smoking. 21 patients had associated hypercholesterolemia. 4 patients had diabetes mellitus and 4 patients had coronary artery disease. Shortness of breath on exertion was observed in 7 patients. History of angina, palpitation was present in 6patients. Chest skiagram showed cardiomegaly in 1 patient. Echographically L.V.H was evident in 13 patients. L.V. systolic dysfunction was present in 6 patients. Diastolic dysfunction was present in 3 patients. One patient had in hospital mortality. Hypertension was observed in 56 of the 142 patients studied (39.4%). It was most commonly observed in the age group between 50 – 70 years when compared to those below 50 years and more than 70 years of age group. It was more frequent in women compared to men in the ratio of 36:20. Symptoms of angina and palpitation were more frequently observed in 20 patients with hypercholesterolemia (P value .03). 14 out of 49 patients had chest x-ray changes of cardiomegaly. This was associated with shortness of breath N.Y.H.A class III and IV. This association had statistical significance (P value 0.00). E.C.G changes of previous M.I were present in 9 out of 49 patients. All of them had breathlessness at rest (P value 0.00). This association was statistically significant. There was no statistically significant association

between symptoms of left heart failure with diabetes mellitus and hypertension. Left ventricular systolic dysfunction was evident echocardiographically in 9 patients with severe heart failure symptoms. This association was statistically significant ($P = \text{value } 0.00$). Electrocardiographic changes were observed in 76 out of 142 patients (53%). More men had ECG changes when compared to women in the ratio of 43:33. ECG changes of LVH were more frequently observed in 14 hypertensive patients followed by 10 smokers. There was no significant association between history of angina, palpitation with ECG changes. ECG changes of previous MI were observed in 11 out of 76 patients. All of them had shortness of breath on mild exertion and at rest. This association was statistically significant ($P = \text{value } .00$). 7 out of 11 patients with ECG changes of previous M.I had cardiomegaly on chest x ray. This correlation had statistical significance ($P = \text{value } .00$). ECG changes of previous MI were more frequently seen among the 11 out of 12 patients with past history of CAD followed by 6 diabetic patients. 19 out of 76 patients had dense hemiplegia. 11 patients with previous MI changes had massive infarct on C.T. 4 out of 17 patients with B.B.B changes had diastolic dysfunction in the echocardiography. Another 4 patient with BBB changes had LV systolic dysfunction 27 patients of varying ECG changes had L.V systolic dysfunction. 19 out of 24 patients with E.C.G changes of LVH echocardiographically which was statistically significant ($P = \text{value } .00$). 9 out of 11 patients with ECG changes of previous MI had dense hemiplegia. This was also statistically significant ($P = \text{vlaue } .00$). 12 patients with changes of previous M.I had massive infarct on C.T ($P \text{ value } .00$) ECG changes of arrhythmias was observed in 13 patients with hypercholesterolemia and 10 patients with hypertension. There was no statistical significance in the above association. Left ventricular hypertrophy was observed in 65 patients. echocardiographically. Most of them were in the age group between 60-70 years followed by 50-60 years of age. More number of men had L.V.H when compared to women in the

ratio of 41: 24. L.V.H. was observed commonly in 39 smokers followed by 29 hypertensives. It was also evident in 13 alcoholics. 15 patients with L.V.H had history of angina and palpitation. NYHA class I symptoms were frequently observed in patients with L.V.H ($P \text{ value } = 0.09$). 16 patients with LVH had dense hemiplegia ($P \text{ value } = 0.03$). Massive infarct on C.T was evident in 18 patients ($P \text{ value } = 0.04$). 6 patients had associated diastolic dysfunction echocardiographically. However this association was not statistically significant. 19 patients with ECG changes of LVH had LVH echocardiographically. 11 patients with cardiomegaly on chest x-ray had LVH echocardiographically 9 patients with L.V.H had left ventricular systolic dysfunction echocardiographically. This association was statistically significant ($P \text{ value} = 0.02$). 3 patients with LVH had in hospital mortality.

Discussion

The number of patients enrolled in the study was 142. LV function studies in association with ischaemic stroke have been done by Allison G. Hays, M.D, Department of Medicine, New York (1994-1997) in a subset of patients from the Northern Manhattan study 2006 (NOMAS). In a study done by them, 270 patients of ischaemic stroke were evaluated for LV function. Framingham study and VH ef trial⁵¹ analysed the various risk factors in association with LV dysfunction in ischaemic stroke patients [8]. ECG changes in stroke patients were analysed by DS Goldstein during 1979. In SOLVD⁵⁵ study, heart failure in stroke patients was evaluated. Among the patients studied 33% were between 51-60 years followed by 29% between 61-70 years. The average age of patients studied was 58 years. The lesser incidence in people below 50 years of age could be because in our study we excluded patients with valvular heart disease and the causes of young stroke [9]. The number of patients of over 70 years was also less is possibly because less no of people live beyond this age. The age incidence in the current study was similar to the northern manhattan study. In the

NOMA study also the age of patients more than 70 and younger than 50 years was less. 51% of patients in current study were chronic smokers where as in NOMA study 23% were smokers. This difference could be due to the higher incidence of smoking in Indian men when compared to people of Western country where the habit of smoking was comparatively less than alcohol intake [10]. The present study showed statistically significant association between smoking, hypertension and diabetes. The association between smoking and clinical severity and morbidity of the stroke were also statistically significant in the present study. The incidence of hypercholesterolemia was more in the present study (54%) where as it was less in the NOMA study (38%) [11]. The above difference could be due to the changes in the life style pattern of the people of our country with associated alcohol intake and smoking and also due to the increase in associated co morbid conditions like atherosclerosis, diabetes hypertension and CAD [12]. The incidence of hypertension was 39% in present study which was less when compared to NOMA study (i.e. 78%). This could be due to the difference in the incidence of comorbid conditions like diabetes, CAD, dyslipidemia. The association of hypertension and C.A.D was statistically significant in the present study. The ECG changes of LVH and hypertension was statistically significant in the present study [13]. The incidence of diabetes in the present study was 18.3% as compared to the NOMA study of 43%. The above difference due to the sedentary life style of the western people and also due to the higher incidence of obesity among the people of western countries [14]. There was a statistically significant correlation between diabetes and LVSD. In hospital stay mortality was statistically significant among diabetic patients. Since we were assessing the echocardiographic evidence of LV dysfunction, we evaluated the cardiac dysfunction in detail [15]. The symptoms of cardiac dysfunction was observed in the study group patients on admission. 20% had H/O angina and 49 patients had shortness of breath of varying degree. 4

patients had shortness of breath at rest. There was significant correlation between shortness of breath of severity and ECG changes of previous MI. Shortness of breath of at rest had a significant correlation with LVSD in present study. Clinical picture of stroke with altered mentation and severity of the stroke had statistically significant correlation with cardiac symptoms [16]. ECG changes in the stroke patients were compared with a study of ECG changes in stroke patients by DS Goldstein 1979 .The present study group patients had less frequency of ECG changes when compared to DS Goldstein study [17]. However, the ECG changes of LVH and E.C.G changes of arrhythmias followed by E.C.G changes of previous M.I were commonly observed in both the studies The above ECG changes could be attributed to the underlying hypertensive, atherosclerotic cardiovascular disease, sympathetic hyperactivity, and possibly myocardial necrosis [18]. The current study showed that the E.C.G changes of previous MI had a statistically significant correlation with severe heart failure symptoms of NYHA class III and IV (P value =.00). The above patients also had a statistically significant association with chest x – ray changes of cardiomegaly (p value =.00). 12 patients had diastolic dysfunction in the present study. Most of them were between 51-60 years followed by less than 50 years. The number of men was more than women in the ratio of 7:5 [19]. Diastolic dysfunction was more frequent in hypertensives than diabetics in the ratio of 5:2. One patient with C.A.D had diastolic dysfunction. There is no statistically significant association between history of angina, palpitation and symptoms of left heart failure and diastolic dysfunction. The association between D.D.F and chest x- ray, E.C.G changes is also statistically not significant. There is no significant association between diabetes, CAD and diastolic dysfunction in the present study. However, association between mortality and diastolic dysfunction was statistically significant (P value = 0.01) [20].

Conclusion

Hypercholesterolemia was observed as the most common risk factor among the ischaemic stroke patients. Coexisting coronary artery disease and diabetes mellitus had positive correlation with left ventricular systolic dysfunction. Smoking was one of the most common risk factor observed among the ischaemic stroke patients. Patients with symptomatic heart failure of NYHA class III and IV had a positive correlation with left ventricular systolic dysfunction and clinical morbidity in ischaemic stroke. ECG changes of previous MI had statistically significant correlation with left ventricular systolic dysfunction and clinical morbidity in ischaemic stroke. Chest X- ray changes of cardiomegaly were observed among 4 out of 9 patients with in hospital stay mortality. LVSD had no positive correlation with mortality. 6 out of 12 patients with diastolic dysfunction were asymptomatic.

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