Original Research Article

Correlation of 2D-Echocardiography Findings in Young Patients of Myocardial Infarction with Prevalence of Risk Factors

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Abstract

Background: The prevalence of Coronary Artery Disease (CAD) has progressively increased in India during the later half of the last century. Projection based on the Global Burden of Disease Study estimate that by the year 2020, the burden of atheroembolic cardiovascular disease in India would surpass that in any other region in the world.

Objectives: To Correlation Of 2D-Echocardiography Findings In Young Patients Of Myocardial Infarction With Prevalence Of Risk Factors in Ghaziabad, Uttar Pradesh area, From May 2010 to April 2011.

Materials and methods: 50 patients of aged 18 – 45 yrs with acute myocardial infarction were evaluated on the basis of age, sex, socioeconomic status, family history of coronary artery disease, smoking, obesity, history of hypertension, diabetes, dyslipidemia, ECG and Ejection Fraction on 2D-ECHO.

Results: Mean age of study group was 36.2. Male were more affected than female. Prevalence of family history of coronary heart disease was 35%. 55% of patients were smokers. 20% of patients were obese. 75% patients had dyslipidemia. 25% had history of hypertension and 20% were diabetic.

64% of patients in present study had anterior wall MI. Left Ventricle End Diastolic Diameter (LVEDD) mean 49.84 mm. Left Ventricle End Systolic Volume (LVESD), mean was 38.36 mm. Interventricular Septum thickness (IVS) mean was 9.86 mm. 56% had moderate LV dysfunction. MR mostly present in EF less than 40%. 12% cases had presence of pericardial effusion. 66.66% smokers have MR on 2D-Echocardiography.

Conclusion: The Incidence of Myocardial Infarction is rising in young individuals owing to change in lifestyle pattern, eating habits, more stress and workload. Incidence remained highest in Males as compared to females. Highly associated risk factor in young myocardial infarction patients are dyslipidemia and smoking. Other traditional risk factors associated with myocardial infarction like diabetes, hypertension, obesity are also very much correlated and their incidence is also seems to be increasing. The role of 2D-Echocardiography in establishing the diagnosis, location, and extent of MI, in diagnosing mechanical complications of infarction, and in providing prognostic information that is important for risk stratification.

Key words

Correlation, 2D-Echocardiography, Young Patients, Myocardial Infarction.

Introduction

The prevalence of Coronary Artery Disease (CAD) has progressively increased in India during the later half of the last century. Projection based on the Global Burden of Disease Study estimate that by the year 2020, the burden of atheroembolic cardiovascular disease in India would surpass that in any other region in the world.

Despite impressive strides in diagnosis and management over past three decades, Acute myocardial infarction continues to be a major public health problem in industrialized world and developing countries. Although the death rate from acute myocardial infarction has declined by about 30 percent over past decade, in developed countries, its development is still a fatal event in approximately one-third of the patients [1].

The risk of Coronary Artery Disease in Indians is 3-4 times higher than white Americans and as much as 20 times higher than Japanese. Indians are prone as a community to Coronary Artery Disease at a much younger age and also show higher incidence of morbidity and mortality than other ethnic groups [2]. Conventional risk factors [3, 4] are as important in determining the risk of Coronary Artery Disease in Indian patients as they are in other population. The key to combat the increasing incidence of Coronary Artery Disease among Indians is the control of various risk factors [5, 6] by population-based strategy. So by studying the role of risk factors, we can enhance our ability to institute effective preventive and control measures.

2D-Echocardiography is a non-invasive method of imaging the heart and is based on ultrasound principle. It can provide a wealth of helpful information, including the size and shape of the heart, its pumping capacity and the location and extent of any damage to its tissues. It has been used to assess the status of the patient and is used to define the prognosis of patients of acute myocardial infarction.

The present study is undertaken to find out the association of various risk factors and clinical profile [7] of Acute Myocardial Infarction in Young Patients (18 - 45 years) with 2D-Echocardiography, which are the most productive part of total population, in Ghaziabad, Western Uttar Pradesh.

Aim and objectives

- To study clinical profile of acute myocardial infarction in young patients 18 - 45 years of age.

- To study the incidence of various risk factors in young patients with myocardial infarction.
- To study the association and correlation of various risk factors with myocardial infarction with 2D-Echocardiography in those patients.

Materials and methods

The study was conducted in Department of Medicine and Department of Radiology of Santosh Medical College and Hospital. Study was conducted on 50 cases of acute myocardial infarction. Patients more than 18 years and less than 45 years of age presented with complaints of chest pain, palpitation (or) breathlessness (or) a combination of these were subjected primarily to electrocardiographic studies to confirm myocardial infarction.

All patients having ST segment elevation (> 1 mm in inferior oriented leads (or) >2 mm in anterior oriented leads) in at least two consecutive leads were considered to have myocardial infarction and then included in the study.

Detailed history and clinical examination will be done in patients satisfying the selection criteria, special stress was laid in the history on Occupation, Socio economic status, History of DM, PVD, HT or IHD, History of smoking or alcohol consumption, sedentary life style, Family history of premature CAD or CVA in any of the first degree family members (male < 55 years of age and female <65 years of age). They were screened for obesity by body mass index (w / h2).

A detailed CVS examination included presence of gallop, pericardial rub, and systolic murmur. RS examination was carried out for evidence of basal crepitations and rhonchi. Patients having associated congenital or valvular heart disease were excluded. All patients were be subjected to the following laboratory investigations :- Complete hemogram, ESR, PCV, Urine for sugar, Renal Function Tests, Liver Function Tests, Fasting lipid profile for Dyslipidemia, Fasting Blood Sugar and Post-Prandial Blood Sugar for Diabetes Mellitus, ECG and chest X Ray PA view and 2D Echocardiography for left ventricular function and evidence of CAD.

Statistical Analysis

The groups were compared for all variables using Student's t-test to compare equality for means. The results are presented as percentage and mean ± SD.

Results

Mean age of study group is 36.24 ± 4.32 years. Male were more affected than female, with M : F ratio of 5.25 : 1 . Prevalence of family history of coronary heart disease was 35%. Maximum patients belonged to lower class category (52 %) followed by middle class (28 %). 55% of patients were smokers. 20% of patients were obese. 75% patients had dyslipidemia. 25% had history of hypertension and 20% were diabetic. 64% of patients in present study had anterior wall MI while 24% had inferior wall MI and 12% had antero-septal wall MI. Left Ventricle End Diastolic Diameter (LVEDD) mean 49.84 ± 1.44mm. Left Ventricle End Systolic Volume (LVESD), mean is 38.36 ± 1.94 mm. Interventricular Septum thickness (IVS) mean is 9.86 ± 0.35 mm. 20% of patients had mild LV dysfunction, 56% had moderate LV dysfunction and 24% had severe LV dysfunction. Mitral Regurgitation is 54% of patients where in 86% had mild and 14% had severe MR. MR mostly present in EF less than 40% and Severe MR is present in EF less than 30%. Tricuspid Regurgitation is present in 12% of study group and in mostly cases with EF less than 30% with involvement of anterior wall myocardial infarction. 12% cases had presence of pericardial effusion. Mean ejection fraction in non-smoker (41.86 ± 5.68 %) is comparatively higher when compared with that of smokers (39.11 ± 7.49%). 66.66% smokers have MR on 2D-Echocardiography. 83.33% cases with TR were smokers. People with Sedentary Lifestyle had

less ejection fraction (37.48 ± 7.09 %) when compared to group with non-sedentary lifestyle (42.85 ± 5.55 %). Patients with history of Hypertension (39.67 ± 6.89 %) had slightly reduced ejection fraction when compared to non-hypertensive group (40.61 ± 6.84 %). Diabetic group have marginal increased ejection fraction (43.20 ± 4.41 %) when compared with non-diabetic group (39.68 ± 7.14 %) as per **Table – 1** and **Table - 2**.

Table 1 - 2D Echocardiography Findings

S. No.	Parameters	Normal	Our Study
1	LVEDD	49±4 mm	49.84 ± 1.44 mm
2	LVESD	30±5 mm	38.36 ± 1.94 mm
3	IVS	9±1 mm	9.86 ± 0.35 mm
4	EF	58 ± 7 %	40.38 ± 6.8 %
5	LV Dysfunction		
	MILD	EF > 46%	20%
	MODERATE	EF 36 - 45%	56%
	SEVERE	EF < 35%	24%
6	MR		54%
7	TR		12%
8	Pericardial Effusion		12%
9	LV Clot		2 cases

Table No. 2

S. No.	Clinical Features	Our Study	Dwivedi et al 2000	P. Jit Singh et al 2001	Dani et al 2003
1	No. of Cases	50	70	42	50
2	Mean Age	36.24	36.6	38.4	34.4
3	M:F ratio	5.25:1	4:1	4.25:1	4.5:1
4	F/H of CAD	36%	-	23%	36.60%
5	H/O Smoking	56%	61%	40.4%	60%
6	Obesity	20%	35.70%	16.6%	-
7	Dyslipidemia	76%	41.60%	9.5%	42%
8	H/O HTN	26%	51%	38.9%	8%
9	H/O DM	20%	7%	11.90%	10%
10	Type of MI				
	A. Ant Wall	64%	-	71.4%	66%
	B. Inf Wall	24%	-	23.8%	16%

Discussion

50 young patients (18 – 45 years) of acute myocardial infarction with average age of 36.24 ± 4.32 years [21, 24, 25] were studied. Maximum (84%) were Males. The ratio of Male to Female sex ratio in our study is 5.25: 1 [12, 13]. The less incidence in young female may be due to hormonal effects especially estrogen and relative absence of smoking [8-11]. Youngest being 25 years of age and the maximum incidence of the disease was found in 3rd decade. Prevalence of family history of coronary heart disease was 35%. No single patient had history of premature coronary artery disease in the family (i.e. CAD in male < 55 years, female < 65 years) [13].

Maximum patients belonged to lower class category (52 %) followed by middle class (28 %) [21]. Only 20 % patients were from upper class. This may be due to study was conducted in a hospital setup where maximum patients belong to lower or middle socioeconomic class.

55% of patients were smokers [13, 26]. They were smoking beedies or cigarettes. 34% of patients smoked more than five pack years. No female was a smoker and it could be concluded that smoking is a significant risk factor for premature coronary artery diseases.

20% of patients were obese and all of them were male [21, 24]. 46% of patients lead sedentary life style [21]. It may be because of modernization, change in feeding habits like preference to fast foods and oily items, faddism towards vegetables. Rapid urbanization has also changed the life style of people from hard work to office work. Further, less availability of leisure hours and stress in day-to-day work prevented people from sparing time for performing physical exercise.

Dyslipidemia was the most common risk factor in the present study (75% of patients). Combined dyslipidemia was the most common phenotype (52% of patients). 58% had high LDL cholesterol, 36% had low HDL cholesterol, and 40% had high triglyceride [12, 13]. The high intake of fatty and oily feeds in the population of present study that could contribute to high incidence of dyslipidemia in the present study. Moreover the prevalence of diabetes mellitus was also high which could again contribute to dyslipidemia. In addition, in this study more stringent values are taken as cut off to define dyslipidemia (which is recommended now-a-days).

25% had history of hypertension [13, 21] and 20% were diabetic [13, 24]. Feeding habits, higher incidence of obesity and sedentary life style and probable genetic factors could contribute to the difference.

64% of patients in present study had anterior wall MI while 24 % had inferior wall MI and 12% had antero-septal wall MI [13, 21]. Anterior wall MI is more common because LAD Coronary artery is the most frequent culprit for the development of atherosclerosis.

In the present study, the Left Ventricle End Diastolic Diameter (LVEDD) is within the normal range with mean 49.84 ± 1.44mm as the considerate group is majorly composed of young individuals and hence the left ventricular size is bound to be normal in size. Left Ventricle End Systolic Volume (LVESD), mean is 38.36 ± 1.94 mm. Interventricular Septum thickness (IVS) mean is 9.86 ± 0.35 mm which corresponds to normal dimensions. 20% of patients had mild LV dysfunction (Ejection Fraction), 56% had moderate LV dysfunction and 24% had severe LV dysfunction. Mitral Regurgitation is 54% of patients where in 86% had mild and 14% had severe MR. MR mostly present in EF less than 40% and Severe MR is present in EF less than 30%. Tricuspid Regurgitation is present in 12% of study group and in mostly cases with EF less than 30% with involvement of anterior wall myocardial infarction. Total 2 cases have clot on echo. Both had ejection fraction less than 35% and with involvement of anterior wall myocardial infarction. 12% cases had presence of

pericardial effusion, mostly with involvement of anterior wall myocardial infarction and presence of MR [14-20].

Mean ejection fraction in non-smoker (41.86 ± 5.68 %) is comparatively higher when compared with that of smokers (39.11 ± 7.49 %). 66.66% smokers have MR on 2D-Echocardiography. 83.33% cases with TR were smokers. 2 cases that had Clot on 2D-Echo, were smokers. 83.33% cases of Pericardial Effusion were smokers. This denotes that the smoking as an independent risk factor for Acute Myocardial Infarction may also be a risk factor for poor left ventricular function outcome. People with Sedentary Lifestyle had less ejection fraction (37.48 ± 7.09 %) when compared to group with non-sedentary lifestyle (42.85 ± 5.55 %) which may be due to exercise/physical training of the heart. Patients with history of Hypertension (39.67 ± 6.89 %) had slightly reduced ejection fraction when compared to non-hypertensive group (40.61 ± 6.84 %). Diabetic group have marginal increased ejection fraction (43.20 ± 4.41 %) when compared with non-diabetic group (39.68 ± 7.14 %). No correlation between Hypertension and MR and TR was found. No correlation between Diabetes and MR and TR was found [22, 23, 26, 27].

Conclusion

The Incidence of Myocardial Infarction is rising in young individuals owing to change in lifestyle pattern, eating habits, more stress and workload. Incidence remained highest in Males as compared to females. Highly associated risk factor in young myocardial infarction patients are dyslipidemia and smoking. Other traditional risk factors associated with myocardial infarction like diabetes, hypertension, obesity are also very much correlated and their incidence is also seems to be increasing.

The role of 2D-Echocardiography in establishing the diagnosis, location, and extent of MI, in diagnosing mechanical complications of infarction, and in providing prognostic

information that is important for risk stratification. In our study, total 50 cases of acute myocardial infarction were studied and complications like mitral regurgitation, tricuspid regurgitation, pericardial effusion, low ejection fraction, dysmobility of ventricular wall was studied on 2D-Echocardiography and compared with the risk factors responsible for Acute myocardial infarction. It was found that the risk factors viz. smoking, hypertension, sedentary lifestyle, male sex have higher incidence of left ventricular dysfunction as well as complications on 2D-Echocardiography. In this study, the 2D-Echo was done post-MI and as association is found between the risk factors and 2D-echo outcome post-MI and as it being a non-invasive procedure, it may help in risk stratification of the patient.

Acknowledgement

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