STUDY OF AORTIC VALVE SCLEROSIS IN PATIENTS WITH ACUTE ST ELEVATION MYOCARDIAL INFARCTION AND ITS EFFECT ON MORBIDITY AND MORTALITY IN THOSE PATIENTS

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ABSTRACT

BACKGROUND

Aortic valve sclerosis is a pre-runner to development of aortic valve stenosis and an indicator of increased ongoing atherosclerotic activity. It has been proposed that AVS sheds light into state of coronary vessels without doing any invasive procedure like angiogram. These study findings suggest that there is a pathogenic link between aortic sclerosis and acute coronary syndromes especially acute ST elevation MI.

MATERIALS AND METHODS

This Prospective Observational Study was conducted among 60 patients of both sexes with acute ST elevation Myocardial Infarction, admitted and thrombolysed in Intensive Coronary Care Unit in Government Rajaji Hospital, Madurai, from June 2015 to September 2015. On the day of admission, Patients are evaluated for the presence of aortic valve sclerosis by 2D echocardiography. All the cases with STEMI are followed up for immediate outcome for a period of 7 days in the hospital and outcomes recorded. Statistical analysis was done using Student's 't' test.

RESULTS

There is no significant correlation between age or sex and aortic valve sclerosis. No significant correlation was found between mortality and aortic valve sclerosis. There was significant association between LV dysfunction and aortic valve sclerosis. Presence of sclerotic aortic valve positively correlated with re-infarction.

CONCLUSIONS

From this study, we conclude that Aortic Valve Sclerosis is an independent risk factor in predicting the Morbidity in patients with A/c ST Elevation MI, i.e. there is a positive correlation between incidence of AVS and severe LV dysfunction and also with Incidence of Re-infarction.

KEYWORDS

Aortic Valve Sclerosis, Acute ST Elevation Myocardial Infarction.

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INTRODUCTION: Aortic valve sclerosis was until recently considered a benign degenerative process of the elderly which need not be further evaluated. But in view of recent developments, it has been found out that AVS is associated with increased cardiovascular mortality and morbidity.[1]

In spite of the high incidence of myocardial infarction in our scenario, there is a lack of understanding of its association with the common finding of aortic valve sclerosis in our setup.[1] Having an understanding of an association between the two, may help to understand better, the complex pathophysiological aspects involved in acute coronary syndromes.[2] It has been proposed that AVS sheds light into state of coronary vessels without doing any invasive procedure like angiogram. These study findings suggest that there is a pathogenic link between aortic sclerosis and acute coronary syndromes especially acute ST elevation MI.[3]

Aortic valve sclerosis is a pre-runner to development of aortic valve stenosis and an indicator of increased ongoing atherosclerotic activity. This study is conducted to emphasise this point and review the evidence that aortic sclerosis is a useful adjunctive tool in cardiovascular risk stratification and that its progression to haemodynamically

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significant aortic stenosis is a potential focus for individual monitoring and for interventional studies.

Aortic valve sclerosis is associated with adverse cardiovascular outcomes.[1] However, the mechanism by which such non-obstructive valve lesions lead to excess cardiovascular risk has not been clearly understood. Histopathologic studies have shown much similarities pathologically between aortic valve undergoing degenerative disease and coronary atherosclerosis with evidence of inflammation common to both conditions. Inflammation has also been implicated in the precipitation of coronary plaque rupture. Calcified or degenerative aortic valve disease is one of the most common aetiology of acquired aortic valve stenosis. Historically, it was seen as a degenerative "senile-like" process, resulting from chronic usage -"wearing and tearing" – of the aortic valve.[2] However, several previous studies have suggested that calcific valve disease is not simply due to age-related senile degeneration but, rather, it is an active disease process with identifiable initiating risk factors, clinical and genetic risk factors, and cellular and molecular pathways that mediate disease progression.[4] Histopathologically, the early lesions of aortic valve sclerosis resemble arterial atherosclerotic plaques. Furthermore, atherosclerotic risk factors and clinical atherosclerotic cardiovascular disease are independently associated with aortic valve sclerosis[4] suggesting that it represents an atherosclerosis-like process involving the aortic valve. In this article, we have tried to review the available data on calcific aortic valve disease, in order to characterise its relationship with the atherosclerotic process and its effect on early mortality and morbidity in coronary heart disease patients.

MATERIALS AND METHODS

STUDY POPULATION

This study is a prospective observational study conducted among 60 patients of both sexes with acute ST elevation myocardial infarction, admitted and thrombolysed in Intensive Coronary Care Unit in Government Rajaji Hospital, Madurai, from June 2015 to September 2015.

INCLUSION CRITERIA: Patients diagnosed with acute ST elevation MI within 24 hrs. of onset of symptoms got admitted and thrombolysed in Intensive Coronary Care Unit.

EXCLUSION CRITERIA: Acute STEMI patients undergoing PCI (either Primary PCI, Rescue PCI or Facilitated PCI) during the course of stay in hospital, presence of aortic stenosis on 2D Echo, patients with STEMI non-thrombolysed and Acute Coronary Syndromes other than STEMI (Non-STEMI and Unstable Angina), age < 18 yrs.

Ethical Committee Approval: Obtained.

A detailed medical history and clinical examination done. All blood investigations done on the day of admission are recorded. Details of ECG on the day of admission and Echo showing incidence of aortic sclerosis is recorded. Outcome of the patients are recorded on Day 7 Echo as either improved (with mild, moderate or severe LV dysfunction) or re-infarction or expired.

Study Protocol: Cases (60 in number) with history of chest pain within previous 24 hours with 12-lead ECG changes suggestive of acute ST elevation MI who got admitted in Intensive Coronary Care Unit are taken up for the study. On the day of admission, Patients are evaluated for the presence of aortic valve sclerosis by 2D echocardiography. All the cases with STEMI are followed up for immediate outcome for a period of 7 days in the hospital and outcomes recorded. Patients are divided into mortality and survival group. In survival group, two parameters are taken into consideration; Systolic Heart Failure i.e. Echo LVEF (Ejection fraction) on day 7 of admission {Mild (EF = 41-50%), Moderate (EF = 31-40%) & Severe (EF ≤ 30%) LV dysfunction}; Incidence of Re-infarction (within 7 days).

STATISTICAL ANALYSIS: The information collected regarding all the selected cases were recorded in a Master Chart in Excel sheet. Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. Using this software range, frequencies, percentages, means, standard deviations, 't' value and 'p' values were calculated. Student's 't' test was used to test the significance of association between quantitative variables and incidence of Aortic valve sclerosis and Yate's and Fisher's chi square tests for qualitative variables. A 'p' value less than 0.05 denotes significant relationship. Regression analysis was done for estimation of gestational age with the help of other variables.

RESULTS: A total of 60 patients were included in the study, who got admitted in ICCU with diagnosis of acute STEMI who underwent Thrombolysis in GRH Madurai. Most of the patients belonged to age group 41 to 50 yrs., followed by group 51 to 60 yrs., with an average of 50.4 yrs. Among the patients studied in this project, 80% were males. In the conventional risk factors studied from this group, for IHD, Diabetes was found in 26.7% and Hypertension in 18.3%. Other well-accepted risk factors like Peripheral Occlusive Disease and Smoking surmounted to 10.0% and 16.7% respectively. Also incidence of Dyslipidaemia and Previous h/o MI was found in 8.3% and 21.7% of study group.

The main aim of study was to find Prevalence of AVS, which was checked in Day 1 echo, and was tabulated and found in 16.7% of study population. In the initial echo itself along with detection of Aortic Sclerosis, it was also checked which wall Of Myocardium suffered. It was found out to be equal in Anterior wall and Inferior wall.

Aortic Sclerosis	Cases	
	Number	%
YES	10	16.7
NO	50	83.3
Total	**60**	**100.0**

Table A1: Incidence of Aortic Sclerosis

Diagnosis	Cases	
	No	%
AWMI	30	50
IWMI	30	50
TOTAL	**60**	**100**

Table A2: Diagnosis

Then these patients were followed up for next 7 days and grouped under mortality and survival groups which is shown in Table A3.

Mortality	Cases	
	Number	%
Alive	57	95
Dead	3	5
Total	**60**	**100**

Table A3: Mortality

Among the survival group, repeat echo was done on Day 7, they were then grouped under different categories based on their Ejection Fraction into different Grades of LV Dysfunction. Most of the patients fell on mild LV dysfunction i.e. 41 to 50%.

LV Dysfunction	Cases	
	Number	%
Normal (EF% Above 50%)	5	8.3
Mild LV Dysfunction (EF% 41% - 50%)	30	50
Moderate LV Dysfunction (EF% 31% - 40%)	19	31.7
Severe LV Dysfunction (EF% < 30%)	6	10
Total	**160**	**100**
Range	25% - 58%	
Mean	42.4%	
SD	8.0%	

Table A4: LV Dysfunction

Also checked in the survival group along with grading of LV dysfunction was Incidence of Re infarction which was also taken as a standard for morbidity.

INTERPRETATION OF RESULTS: There is no significant correlation between age or sex and aortic valve sclerosis (p= 0.9565, p= 0.3537). No significant correlation was found between mortality and aortic valve sclerosis (p= 0.0693). There was significant association between LV dysfunction and aortic valve sclerosis (p= 0.0244). Presence of sclerotic aortic valve positively correlated with re-infarction (p= 0.002 Significant).

DISCUSSION: The present study findings are consistent and correlate those of prior studies documenting that patients with aortic sclerosis are at increased risk of adverse cardiovascular events.[1] In this study, as in previous reports, patients with aortic valve sclerosis suffered an increased incidence of adverse cardiovascular events leading to mortality and morbidity.[1,4] However, the present study results demonstrate that aortic sclerosis is not the mediator of adverse outcomes but rather an indicator of atherosclerosis. Study data demonstrate that patients with acute coronary syndromes (in this study acute ST elevation MI) more severe aortic sclerosis suffered the highest incidence of adverse cardiovascular events[3] i.e. chances for death and re-infarction and lower ejection fraction values. Multivariable analysis which is shown later has demonstrated that aortic sclerosis was not independently associated with adverse cardiovascular events but compounded the risks.

Given the absence of a direct association between aortic sclerosis and adverse outcomes by analysis[5] and the lack of a conclusive independent pathophysiologic link between non-obstructive aortic sclerosis and cardiovascular events, the present data suggest that aortic sclerosis is an indicator for accelerated atherosclerosis and presence of CAD, which constitute the factors associated with adverse coronary events.

Local coronary inflammation and atherosclerosis is thought to play a fundamental pathophysiologic role in the induction and progression of chronic CAD. The present findings documenting aortic sclerosis and their association with poor outcomes in patients with coronary heart disease are novel and provide the basis for speculation regarding the mechanisms by which inflammation[6] generates increased risk in such patients. Furthermore, endothelial injury at sites of haemodynamic stress has been found out as the key factor facilitating both coronary atherosclerosis and aortic sclerosis.

The present study demonstrates associations, not direct cause and effect, but together with the above found out observations, the study provides the basis for speculation that the inflammatory process that initiates and promotes coronary atherosclerosis also impacts the aortic valve and contributes to the development of aortic valve sclerosis. Thus, aortic sclerosis appears to be both a result of and a marker for the adverse effects of inflammation in the cardiovascular system.

There are important short comings pertinent to the methods of this study. The emergency room chest pain population with ST elevation MI may represent a group at higher risk for cardiovascular events. Another drawback is that present study lacks angiographic and histopathologic data. It is highly possible that a larger sample size would have shown aortic sclerosis to be an independent predictor of adverse cardiovascular events.

The present study has high chance of prognostic and therapeutic implications. Anti-inflammatory agents such as aspirin, known to exert salutary effects on cardiovascular events in patients with CAD, and statins, which reduce cardiovascular events and has anti-inflammatory property, could be beneficial in patients with aortic valve sclerosis. Further prospective studies will be needed to determine whether such diagnostic and therapeutic strategies can improve outcomes in these patients. Prospective studies are

needed to determine whether aortic valve sclerosis accelerates to aortic valve stenosis and further angiographic study is needed to know about extent of atherosclerosis in coronary vasculature.

STRENGTH OF THE STUDY: Rigid Inclusion Criteria, close monitoring and supervision by specialists, followup of all patients with review echocardiogram in one week span.

LIMITATIONS OF THE STUDY: Study should be conducted in a large group of population, inflammatory markers taking part in atherosclerosis not evaluated, angiography not done to evaluate extent of atherosclerotic plaques in patients.

CONCLUSION: From this study we conclude that Aortic Valve Sclerosis is an independent risk factor in predicting the Morbidity in patients with Acute ST Elevation MI,[1] i.e. there is a positive correlation between incidence of AVS and severe LV dysfunction and also with Incidence of Re-infarction.[2] No significant correlation could be made out between AVS and mortality, probably due to small sample size that was taken. The risk posed by AVS also had cumulative effect along with other conventional risk factors like diabetes, hypertension smoking, peripheral occlusive disease, dyslipidaemia, previous history of coronary artery disease. Henceforth, it is safe to say that Prevalence of Aortic Valve Sclerosis is more in patients with STEMI compared to general population and its presence is an indicator of increased morbidity in STEMI patients compared with STEMI patients without AVS.

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