
Sclerotic Aortic Valve and Coronary Heart Disease

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CABM

Summary:

Background: Aortic valve sclerosis, is considered to be a manifestation of coronary atherosclerosis, and is associated with an increased incidence of cardiovascular events.

Method: Echocardiographic study of 52 patients with aortic valve sclerosis associated with ECG finding of ischemic heart disease.

Result: Ischemic changes were positive in 31(59.6%).

Conclusion: Aortic valve sclerosis should be considered a potential marker of coexisting coronary disease.

Key words: Aortic valve sclerosis, Coronary heart disease

Introduction

Aortic valve sclerosis (AVS), a condition of thickening and calcification of the normal tri-leaflet aortic valve without the obstruction to the left ventricular outflow, is likely the initial stage in the development of aortic stenosis, and is associated with an increased incidence of cardiovascular events^[1].

AVS is considered to be a manifestation of coronary atherosclerosis. Recent studies demonstrated an association between AVS and significant coronary artery disease (CAD)^[2].

In a population-based echocardiographic study, 2% of persons 65 years of age or older had frank calcific AS, whereas 29% exhibited age-related aortic valve sclerosis without stenosis^[3,4]. This form of AVS may be accompanied by calcification of the mitral annulus^[4].

Methods:

This study was done in Al-Yermouk teaching hospital, department of medicine for the period extended from September 2008 to March 2009. Echocardiographic study of 52 patients were analyzed, 28 (53.8%) were females and 24 (46.2%) were males. Age distribution is between 50 to 82 years. The echocardiographic machine is Philips type model 2003. M-mode, two-D and Doppler examination was done to every patients included in the study.

Doppler study was used to measure pressure gradient across the aortic valve, value less than 20mmHg is mild, between 20-50 is moderate while above 50 mmHg is severe stenosis. Criteria for

diagnosis of aortic sclerosis depend on finding of increase thickness and calcification of the valve by echocardiography.

Pressure gradient across aortic valve was measured by using modified Bernuli equation ($\text{gradient} = 4 (\text{velocity})^2$). Standard 12 leads ECG was done for every patient looking for abnormality of ischemia or myocardial infarction^[4].

Data were analyzed using SPSS-16 software packages available, with presentation of data as proportions and testing of significance of difference using Pearson chi-squared test and Fisher-Exact test for small numbers with P value equal or less than 0.05 as the level of significance.

Results:

Of the 52 patients with aortic sclerosis, 28 (53.8%) was female, 24 (46.2%) was male. Pressure gradient across aortic valve was increased in 5 patient (9.6%) and it range between (20-36 mmHg), mild increase in 3 patient (20 mmHg), moderate in 2 patients (20-50 mmHg) (**Table 1**).

Ischemic changes were positive in 31 (59.6%) patients, ranging from myocardial infarction in 13 (25.0%) patient to ST depression, T-wave inversion, and LBBB in 18 (34.6%) patients. **Table 2** shows that hypertension was present in 29 (55.8%) patients. Diabetes mellitus was present in 16 (30.0%) patients. Associated finding was sclerotic mitral leaflets present in 14 (26.0%) patients. Other findings include dilated myopathy, LV hypertrophy, mitral stenosis, and pericardial effusion (**Table 3**).

Table 1: The parameters distribution of patients with aortic valve sclerosis by gender.

		Gender				P value
		Male		Female		
		No	%	No	%	
54--Age (years)	50	4	7.66	2	3.33	313.0
59--55		1	0.50	1	0.50	
64--60		8	1.57	6	9.42	
69--65		4	0.40	6	0.60	
74--70		3	5.37	5	5.62	
79--75		1	5.12	7	5.87	
--80		3	0.75	1	0.25	
Pressure gradient	Yes	2	0.40	3	0.60	772.0
No		22	8.46	25	2.53	
Diabetes mellitus	Yes	7	8.43	9	3.56	817.0
No		17	2.47	19	8.52	
Hypertension	Yes	9	0.31	20	0.69	*014.0
No		15	65.2	8	34.8	
ECG findings	Ischemic changes	15	48.4	16	51.6	0.695
	Non-ischemic changes	9	42.9	1	57.1	
ECG findings	Atrial fibrillation	1	50.0	1	50.0	-
	Flat ECG	1	100	-	-	
	LBBB	2	66.7	1	33.3	
	LVH	1	50.0	1	50.0	
	Pseudo infarction	1	100	-	-	
	MI	7	53.8	6	46.2	
	ST Depression	1	33.3	2	66.7	
	T inversion	4	36.4	7	63.6	
	Sinus tachycardia	-	-	1	100	
	Ventricular ectopics	1	100	-	-	
	Normal	5	35.7	9	64.3	
MI type	Anterior MI	3	60.0	2	40.0	0.719
	Antero-septal MI	2	40.0	3	60.0	
	Inferior MI	2	66.7	1	33.3	
Other associations	Post M leaf sclerosis	4	28.6	10	71.4	-
	Cardiomyopathy-dilated	1	33.3	2	66.7	
	LVH	1	25.0	3	75.0	
	LV Dysfunction	1	50.0	1	50.0	
	MS	-	-	1	100	
	MR	2	100	-	-	
	Pericardial effusion	1	100	-	-	
	Dilated aortic root	1	100	-	-	
	Renal artery stenosis	-	-	1	100	

*The Pearson chi-squared test or Fisher-Exact test for small numbers is significant at the 0.05 level.

Table 2: The parameters distribution of patients with aortic valve sclerosis by pressure gradient.

		Pressure gradient				P value
		Yes		No		
		No	%	No	%	
Age (years)	50--54	-	-	6	100	0.261
	55--59	-	-	2	100	
	60--64	-	-	14	100	
	65--69	2	20.0	8	80.0	
	70--74	2	25.0	6	75.0	
	75--79	-	-	8	100	
	80--	1	25.0	3	75.0	
Gender	Male	2	8.3	22	91.7	0.772
	Female	3	10.7	25	89.3	
Diabetes mellitus	Yes	1	6.3	15	93.8	0.583
	No	4	11.1	32	88.9	
Hypertension	Yes	-	-	29	100	0.008*
	No	5	21.7	18	78.3	
ECG findings	Ischemic changes	3	9.7	28	90.3	0.985
	Non-ischemic changes	2	9.5	19	90.5	
ECG findings	Atrial fibrillation	-	-	2	100	-
	Flat ECG	-	-	1	100	
	LBBB	-	-	3	100	
	LVH	1	50.0	1	50.0	
	Pseudo infarction	-	-	1	100	
	MI	1	7.7	12	92.3	
	ST Depression	-	-	3	100.0	
	T inversion	2	18.2	9	81.8	
	Sinus tachycardia	-	-	1	100	
	Ventricular ectopics	-	-	1	100	
	Normal	1	7.1	13	92.9	
MI type	Anterior MI	1	20.0	4	80.0	-
	Antero-septal MI	-	-	5	100	
	Inferior MI	-	-	3	100	
Other associations	Post M leaf sclerosis	3	21.4	11	78.6	-
	Cardiomyopathy-dilated	-	-	3	100	
	LVH	1	25.0	3	75.0	
	LV Dysfunction	-	-	2	100	
	MS	-	-	1	100	
	MR	-	-	2	100	
	Pericardial effusion	-	-	1	100	
	Dilated aortic root	-	-	1	100	
	Renal artery stenosis	-	-	1	100	

*The Pearson chi-squared test or Fisher-Exact test for small numbers is significant at the 0.05 level.

Table 3: The parameters distribution of patients with aortic valve sclerosis by ECG findings.

		ECG findings				P value
		Ischemic changes		Non-Ischemic changes		
		No	%	No	%	
Age (years)	50--54	4	66.7	2	33.3	0.678
	55--59	1	50.0	1	50.0	
	60--64	7	50.0	7	50.0	
	65--69	7	70.0	3	30.0	
	70--74	3	37.5	5	62.5	
	75--79	6	75.0	2	25.0	
	80--	3	75.0	1	25.0	
Gender	Male	15	62.5	9	37.5	0.695
	Female	16	57.1	12	42.9	
Pressure gradient	Yes	3	60.0	2	40.0	0.985
	No	28	59.6	19	40.4	
Diabetes mellitus	Yes	10	62.5	6	37.5	0.777
	No	21	58.3	15	41.7	
Hypertension	Yes	17	58.6	12	41.4	0.870
	No	14	60.9	9	39.1	
Other associations	Post M leaf sclerosis	9	64.3	5	35.7	-
	Cardiomyopathy-dilated	3	100.0	-	-	
	LVH	4	100.0	-	-	
	LV Dysfunction	1	50.0	1	50.0	
	MS	-	-	1	100.0	
	MR	2	100.0	-	-	
	Pericardial effusion	-	-	1	100.0	
	Dilated aortic root	-	-	1	100.0	
	Renal artery stenosis	1	100.0	-	-	

*The Pearson chi-squared test or Fisher-Exact test for small numbers is significant at the 0.05 level.

Discussion:

Previous reports suggested a relationship between coronary artery disease (CAD) and aortic valve sclerosis (AVS) [1,5]. In our study there is a relation between ischemic changes and aortic sclerosis 31 (59.6%). While in a study by Conte et al, patients with obstructive coronary artery disease had a higher prevalence of AVS (38%) [5], in another study by Chang et al, the mean age was 62±13 years, 59% men, CAD was present in (51%) [6], in a study by Soydic et al, the AVS patients had a higher rate of 3-vessels disease (40%) (p<0.001) [7]. Several clinical factors are associated with calcific aortic valve disease, including male sex, smoking, hypertension, age, hypercholesterolemia and diabetes. In our study female patients were higher 28 (53.8%), hypertension was found in 29 (55.8%) and diabetes in 16 (30.8%). While in a study by Rabkin showed a consistent and significant relationship between hypertension and AVS [1].

Histological and biochemical studies suggest similarities between the mechanism involved in the development of aortic sclerosis and atherosclerosis, suggesting these two diseases may share common pathophysiologic mechanism [8].

Its frequency increases with age, making it a major geriatric problem, of adult aged >65 years, 21-29% exhibit aortic valve sclerosis [8].

Clinically, it can be suspected in the presence of soft ejection systolic murmur at the aortic area, but it can be best detected by echocardiography [8,9].

Aortic sclerosis may be accompanied by mitral annulus calcification up to 50% of cases. In our study it was found in 14 (26%). It is associated with an increase of approximately 50% in the risk of myocardial infarction [10].

Aortic sclerosis is associated with systemic endothelial dysfunction, and a small percentage of cases may progress to aortic stenosis [10,11]. In our study 5 (9.6%) had aortic stenosis.

Lowering of LAD cholesterol by (HMG-coA) reductase inhibitors have been shown to decrease progression of aortic valve calcification [12].

Conclusion:

Aortic sclerosis is not a mere benign finding once diagnosis of aortic sclerosis has been made it should be considered a potential marker of coexisting coronary disease.

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