



Association of Aortic Valve Sclerosis with Coronary Artery Disease

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ABSTRACT

Background

Current evidence suggests, that Arterio-vascular sclerosis (AVSC) is not only a result of ageing, but is linked to increased risk of cardiovascular death also. Sclerosis of the aortic valve has also been shown to be a powerful predictor of obstructive coronary artery disease (CAD) and may be used in CAD risk stratification.

Aim: To study the association between Aortic Sclerosis & Coronary artery disease.

Material & Methods

This is an observational cross-sectional study including 100 patients who were Admitted in GSL General Hospital with Coronary artery disease diagnosed by coronary angiography.

Results

Single vessel disease in 58%, Double vessel disease in 27%, and Triple vessel disease in 15%. In severe AV sclerosis group, 92.9% were Triple vessel disease and this observation was statistically significant with p value=0.0001. Severity of CAD (Gensini score) and degree of AV Sclerosis shows a significant high gensini score was observed as the severity of AV sclerosis increases and this observation was statistically significant with p value<0.0001.

Conclusion

This confirms the existing association between the presence of CAD and AVSC which implicates that presence of AVSC on 2D-Echo Cardiography, can be considered a risk marker for suspicion of CAD.

Keywords

Coronary artery disease, Arterio-vascular sclerosis, Gensini score.

INTRODUCTION

Coronary artery disease (CAD) is a heart disorder that occurs when myocardium does not receive enough blood and oxygen. It is caused by blockage of coronary artery, which results in oxygen supply-demand mismatch. Plaques develop in the lumen of coronary arteries, blocking the blood flow in most cases¹. CAD is more prevalent in both the industrialised and developing nations. According to one study, CAD accounts for 2.2 percent of the worldwide burden of illness and 32.7 percent of cardiovascular diseases². The etiology of CAD is multifactorial which includes both non-modifiable and modifiable risk factors. Non-modifiable elements include gender, age, family history, and genetics while modifiable risk factors include smoking, obesity, lipid levels, and psychological variables.

Aortic valve sclerosis (AVSC) is characterised by aortic valve calcification and thickening in the absence of ventricular outflow restriction³. AVSC has long been thought to be an unintentional echocardiographic result that worsens with ageing. Current evidence suggests, that AVSC is not only a result of ageing, but is linked to increased risk of cardiovascular death also⁴⁵. Sclerosis of the aortic valve has also been shown to be a powerful predictor of obstructive coronary artery disease (CAD) and may be used in CAD risk stratification⁶. Even though viewed as harmless, ejection systolic murmur can be present in individuals with severe aortic valve blockage and is linked to an elevated risk of cardiovascular events⁷.

The present study was conducted to study the association between Aortic Sclerosis & Coronary artery disease among patients Admitted to GSL General Hospital with Coronary artery disease.

AIM & OBJECTIVE

To study the association between Aortic Sclerosis & Coronary artery disease

METHODOLOGY

This is an observational cross-sectional study including 100 patients who were Admitted in GSL General Hospital with Coronary artery disease diagnosed by coronary angiography. A Detailed History and thorough Clinical Examination was carried out in every study subject, including their demographic data and special reference to Coronary Artery Disease Risk Factors like Presence of Diabetes, Hypertension, Tobacco Consumption. Necessary relevant investigations like lipid profile and renal function tests were carried out in every study subject.

RESULTS

The Prevalence of Aortic valve sclerosis in the present study was 39% among which mild sclerosis is seen in 12%, moderate in 13%, and Severe in 14% of patients.

Mean age in group with normal aortic valve is 50.34 ±6.44 years while the mean age in group with sclerosis is 54.79±6.52 years. (Mild - 52.91 ±6.88, Moderate - 54.53 ±6.34, severe - 56.64 ±6.42) A statistically significant difference is observed with relation to Aortic valve sclerosis and age with p-value < 0.04. Out of 39 patients with AVSC, females were 14 (35.9%) and males were 25(64.1%).

In the present study, 41% were smokers, 59% were non-smokers. Among which smoking with AVSC were 20(48.79%) and 21(51.21%) without AVSC. No

significant association was observed with relation to smoking and AV sclerosis as with p-value =0.10.

Out of 100 study population 35(35%) were known diabetic in the present study. Among which 18 (51.42%) had AVSC and 17(48.57%) without AVSC and there was no statistical significance (p value 0.19) and 41.7%, 38.5%, and 57.1% were diabetics in mild, moderate, and severe AV sclerosis groups respectively.

Out of 100 patients 69% were known Hypertensives among which 32(46.38%) had AVSC and 37(53.62%) without AVSC and in the present study 66.7%, 84.6%, and 92.9% were HTN in mild, moderate, and severe AV sclerosis groups respectively, statistically significant with p value=0.04.

Based on Killip classification, 61% were Class I, 32% were class II and 7% were class III. Among which 16(26.22%) with AVSC and 45(73.78%) Without AVSC were in Killips class-1. 50(50%) with AVSC,50(50%) without AVSC were in Killips class-2, and 7(100%) with AVSC were in Killips class-3. 83.3%, 16.7% belong to Class I and Class II in Killip classification under mild group respectively. 46.2%,

46.2%, and 7.7% belong to Class I, Class II, and Class III in Killip classification under Moderate AV group.

57.1% and 42.9% belong to Class II and Class III in Killip classification under severe AV sclerosis group, Hence a statistically significant association was observed with relation to Killip class and AV sclerosis with p-value=0.0001.

The mean Systolic BP in those with AV sclerosis was 149.54 ± 21.20 and is significantly higher in subjects those without AV sclerosis, and found to be statistically significant with p value <0.0001

The mean Diastolic BP in subjects with AV sclerosis was 98.31 ± 9.22 and is significantly higher than subjects without AV sclerosis. This observation was statistically significant with p value<0.0001.

Association between Degree of AV sclerosis and LVEF where Normal Av valves had mean EF of 55.06 ± 5.38 , mild AV sclerosis with mean EF of 52.25 ± 10.05 , moderate AV sclerosis with mean EF of 50.46 ± 8.25 , and mean EF among Severe AV sclerosis was 39 ± 5.00 . These observations were found to be statistically significant. With p value <0.0001.

Table 1: Laboratory profile and AV Sclerosis in study population

Laboratory profile	AV Sclerosis present (Mean ± SD)	AV Sclerosis Absent (Mean ± SD)	T value	P-value
FBS	110.97 ± 39.15	115.71 ± 41.71	0.57	0.56
PPBS	140.90 ± 77.86	156.18 ± 69.85	0.99	0.32
Total cholesterol	244.18 ± 46.47	164.30 ± 22.09	10.02	<0.0001*
Triglycerides	304.54 ± 73.90	153.72 ± 63.11	10.52	<0.0001*
Serum creatinine	1.04 ± 0.22	1.06 ± 0.21	0.45	0.65
Serum albumin	3.58 ± 0.24	3.57 ± 0.17	0.22	0.82
LDL	109.69 ± 24.45	105.51 ± 24.24	0.83	0.40
HDL	52.65 ± 11.67	55.51 ± 10.47	1.24	0.21
VLDL	43.33 ± 19.04	26.38 ± 5.16	5.42	<0.0001*

With respect to observed lipid profile among the study subjects. Total cholesterol was (244.18±46.47) and Triglycerides(304.54 ± 73.90) and VLDL(43.33 ± 19.04) were significantly present between the AV sclerosis present and absent groups. This observation was statistically significant with p values for each group being <0.0001

With respect to involvement of different coronary arteries, in study subjects with CAD ,LAD was involved in 60%, RCA in 30%, and LCX and 10%.

In the severe AV sclerosis group, all subjects had LAD involvement 14 out of 14 (100%) and this observation was statistically significant with p value =0.0001.

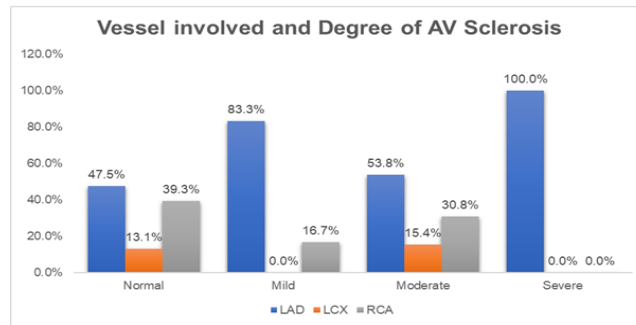


Figure 1: Bar diagram showing vessel involved In studypopulation

With respect to the involvement number of coronary vessels in each individual, Single vessel disease in 58%, Double vessel disease in 27%, and Triple vessel disease in 15%.

In severe AV sclerosis group, 92.9% were Triple vessel disease and this observation was statistically significant with p value=0.0001.

An attempt was made to compare Severity of Coronary artery disease with AV Sclerosis by using Gensini score. On comparison severity of CAD

(Gensini score) and degree of AV Sclerosis shows a significant high gensini score was observed as the severity of AV sclerosis increases and this observation was statistically significant with p value<0.0001

An attempt was made to correlate Aortic Valve Sclerosis with Gensini score by using Spearman's and Pearson's method. On Pearson correlation shows an r-value of 0.84 i.e. a significant positive correlation observed between severity of AV Sclerosis and Gensini score as the p-value calculated to be <0.0001.

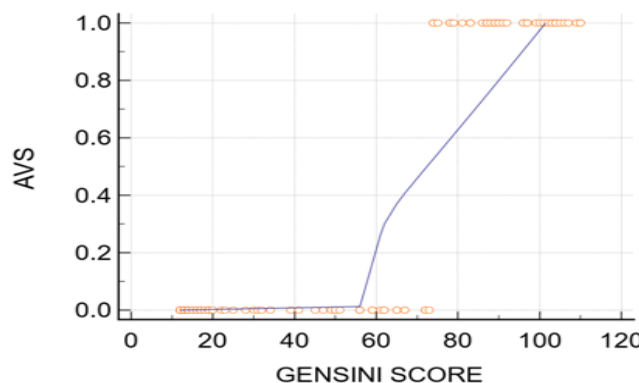


Figure 2: Diagram showing correlation between Aortic valve sclerosis and Gensini score

DISCUSSION

Aortic valve sclerosis (AVSC) is characterised by increased aortic leaflet thickness, stiffness, and calcification without commissure fusion. Doppler echocardiography can be used to assess AVSC, and its presence can lead to aortic valve stenosis, which is indicated by increased aortic systolic velocities.^{8,9}

The Prevalence of Aortic valve sclerosis was 39%. Mild sclerosis in 12%, moderate in 13%, and Severe in 14% in the present study. In study by **Rossi A¹⁰**, Coronary artery disease was diagnosed in 47.6% of patients with AVSC. **Myasoedova et al¹¹** reported that the AVSC was detected in 2,138 (43%) patients.

The mean age in the group with normal Aortic valve was 50.34 ±6.44, with AVSC it was 54.79±6.52 years in the present study, which is similar to the studies done by **AfsoonFazlinezhad et al¹²**, **Shu-Jian Sui et al¹³**, **Harish R. Chandra et al.¹⁶**

With respect to gender, in the present study males with AVSC constituted 25(64.11%), which is similar to **Mohammed Mahmoud et al¹⁷⁻³⁵** (58.3%), **AfsoonFazlinezhad et al^{12-67.9}**(67.9%)

The present study shows 20(48.79%) subjects with AVSC & 21(51.21%) without AVSC, No significant association was observed with relation to smoking and AV sclerosis as the p-value was calculated to be >0.05. The present study results are compared with 4 other studies. **S-Y. HSU et al¹⁴**, **Shu-Jian Sui et al¹³**, **Ihsan Dursun et al.¹⁵**

Ejection Fraction

With respect to EF, the present study shows 46.89 ±9.78 with AVSC, **Shu-Jian Sui et al¹³**-64.4±13.1, **S-Y. HSU et al¹⁴**-48±12.2, Without AVSC EF in the present study shows 55.06 ±5.38, **S-Y. HSU et al¹⁴**-53±9.6, **Shu-Jian Sui et al¹³**-67.3±9.3. The results of

the present study are in comparable with two studies & statistically significant with p value<0.001.

Lipid Profile

Total cholesterol and Triglycerides and VLDL were significantly different between the patients with AV sclerosis and without, higher among the sclerosis group. This observation was similar to the studies done by **Shu-Jian Sui et al¹³**, **S-Y. HSU et al¹⁴**.

Gensini Score

Severity of Coronary artery disease (Gensini score) and Degree of AV Sclerosis shows a significant high gensini score was observed as the severity of AV sclerosis increases and this observation was statistically significant

Serdar Soydic et al¹⁸ found that patients with AVSC had higher Gensini scores because they had both more significantly narrowed coronaries and a higher incidence of 3-vessel disease. There was a significant correlation between AVSC and the coronary angiographic Gensini score. Notably, individuals with AVSC were found to have higher Gensini scores (40.78 ±38.05 vs 18.8 ± 16.4.; p value 0.001).

Juying Qian et al¹⁹ Patients were allocated to four groups based on the quartile of the Gensini score: group A, 0-3.0 points; group B, 3.0-15.0 points; group C, 15.0-41 points; and group D >41 points. The prevalence of AVSC was 20%, 32%, 37% and 64% in these four groups, respectively. There was a significantly higher prevalence of AVSC in patients with a higher Gensini score than in those with a lower score. The prevalence of AVSC was significantly higher in patients with three to four diseased vessels than in those with between none and two stenosed vessels (59% versus 31%, p <0.01).

In study by **Ihsan Dursun et al,¹⁵** Coronary angiography was performed in 291 patients The

median Gensini score was 32 (16-49) in patients with AVSC and 34 (20-48) in patients without AVSC. There was no difference between the 2 groups with respect to the Gensini score ($P = 0.372$).

On comparison of gensini scores with AVSC & without AVSC the present study shows 93.17 ± 10.83 , 32.11 ± 20.80 , **Serdar Soydinc et al**¹⁸- 40.78 ± 38.05 , 18.8 ± 16.4 **Ihsan Dursun et al**¹⁵-32,34. The results are reasonably comparable however they are statistically significant with p value 0.01

CONCLUSION

The study concludes, that there is an association between the occurrence of AVSC and the occurrence of HTN, and compromised left ventricular systolic function. This confirms the main hypothesis of this study of an existing association between the presence of CAD and AVSC. This association may lead to an appreciation of the presence of AVSC on 2D-Echo Cardiography, which can be considered a risk marker for suspicion of CAD

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