Original Article

Does aortic valve sclerosis predicts the severity and complexity of coronary artery disease?

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ABSTRACT

Aim: We assessed the association of aortic valve sclerosis (AVS) with atherosclerotic risk factors and severity and complexity of coronary artery disease (CAD).
Methods: In this retrospective study, a total of 482 eligible patients were divided into 2 groups: AVS present and AVS absent. All major cardiovascular risk factors and coronary lesion characteristics were included.
Results: Age was the only independent predictor of AVS. AVS was not independently associated with the number of obstructive vessels, degree of lesion obstruction and SYNTAX score.
Conclusion: AVS is probably a benign marker of age-related degenerative changes in the heart independent of the severity and complexity of CAD.

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1. Introduction

Being the site of frequent turbulence and mechanical stress from blood flow, the aortic valve, serves as a focus for the deposition of lipids involved in the process of atherosclerosis.[1] Histopathologic studies of aortic valve sclerosis (AVS) show accumulation of atherogenic lipoproteins, inflammatory cell infiltrate, extra cellular matrix and microscopic calcification.[1–4] Several studies have linked AVS with atherosclerotic risk factors, coronary and systemic athero-sclerosis and cardiovascular morbidity, but the data is conflicting.[5–11]

Increased prevalence of obstructive coronary lesions and triple vessel coronary artery disease (CAD) has been shown in patients with AVS, but the data are limited.[12,13] Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) is an angiographic tool for grading the complexity and severity of CAD and provides more comprehensive assessment of coronary lesion characteristics.[14,15] We therefore aimed to determine the association of presence or absence of AVS with cardiovascular risk factors, extent of CAD and complexity and severity of coronary lesions (using SYNTAX score).

2. Methods

The protocol of this retrospective cohort study at a community teaching hospital in Brooklyn, NY was approved by the hospital's Institutional Review Board, and a waiver of patient

informed consent was granted. Electronic medical records of patients who underwent cardiac catheterization (CC) were reviewed for the period of January 2010–December 2013. Among these, the patients who underwent in-hospital transthoracic echocardiograms (TTE) were selected. Data on demographics, cardiovascular risk factors, medication use, coronary lesion characteristics and SYNTAX score were collected. Patients were divided into 2 groups based on the presence or absence of AVS as stated in the TTE reports and were compared based on aforementioned variables. Statistical analysis was done using IBM SPSS Statistics 20. Univariate analyses were carried out using the chi square test for categorical and ordinal variables, and ANOVA or t-test for continuous variables. All risk factors with two-sided $p < 0.05$ on univariate analysis were put into a linear regression model to assess combined effects.

3. Results

Out of 708 patients, 482 patients were eligible: AVS present (384 patients) and AVS absent (158 patients). Baseline patient characteristics are summarized in Table 1.

Table 2 shows the presence or absence of AVS in patients with major risk factors, comorbidities and lesion characteristics, and displays the findings of univariate analyses.

Subsequently, multivariable linear regression analyses were carried out to determine independent associations. All significant factors from univariate analysis, gender and SYNTAX score were included in the model. Only age ($p = 0.001$, β 1.11) was found to be independently associated with the presence of AVS. The presence of AVS was not associated with number of obstructive vessels ($p = 0.831$, β 0.01), lesions with >70% stenosis in major ($p = 0.849$, β 0.95) and minor ($p = 0.100$, β 1.59) epicardial arteries, lesions with 50–70% stenosis in major ($p = 0.267$, β 1.38) and minor ($p = 0.237$, β 0.73) epicardial arteries or SYNTAX score ($p = 0.684$, β 0.02).

4. Discussion

In our study, age was independently associated with the presence of AVS. Other major cardiovascular risk factors, number of obstructive vessels, coronary lesion characteristics and SYNTAX score were not independently associated with AVS.

Our study demonstrates an increase in the prevalence of AVS with aging, especially in patients ≥71 years old. AVS has been consistently linked with age and is considered a marker of senile degenerative changes resulting from hemodynamic stress in heart.[2,10,13,14] In our study, increased prevalence of AVS was noted after age 50 years, which has not been commonly shown in the literature. Whereas, none of the other cardiovascular risk factors shown in Table 2 were associated with AVS.

In a study of 160 patients, Soydinc et al found that AVS was associated with the presence of triple vessel CAD and was independently associated with Gensini score.[13] A study of 230 patients from Fazlinezhad et al found AVS to be an independent predictor of obstructive coronary disease (i.e., ≥50%

Table 1 – Baseline patient characteristics.	
Risk factors	Number – n (%) 482 patients
Hypertension	374 (77.6%)
Smoking	235 (48.7%)
Hypercholesterolemia	268 (55.6%)
eGFR (ml/min/1.73 m²)	
≥90	203 (42.1%)
60–89	141 (29.2%)
30–59	95 (19.7%)
16–29	19 (3.9%)
≤15	24 (4.9%)
BMI (kg/m²)	
<18.5	9 (1.8%)
18.5–25	130 (26.9%)
25.1–30	156 (32.3%)
30.1–35	103 (21.4%)
>35	84 (17.4%)
Diabetes mellitus	212 (43.9%)
Gender — Male	298 (61.8%)
Female	184 (38.1%)
Age (years)	
≤50	78 (16.2%)
51–70	234 (48.5%)
≥71	170 (35.2%)
Coronary artery disease	156 (32.3%)
Congestive heart failure	188 (39%)
Peripheral arterial disease	29 (6%)
CVA/TIA	37 (7.6%)
STEMI	52 (10.7%)
NSTEMI	110 (22.8%)
Unstable Angina	61 (12.6%)
Vessels with coronary artery disease	
0	152 (31.5%)
1	113 (23.4%)
2	117 (24.2%)
3	100 (20.7%)
Lesion characteristics	
Lesions with >70% stenosis in major epicardial arteries	245 (50.8%)
Lesions with >70% stenosis in minor epicardial arteries	147 (30.5%)
Lesions with 50–70% stenosis in major epicardial arteries	138 (28.6%)
Lesions with 50–70% stenosis in minor epicardial arteries	79 (16.4%)
Lesions with less than 50% stenosis in epicardial arteries	304 (63.1%)
Arteries with diffuse disease	252 (52.3%)
Calcified lesions	83 (17.3%)
Bifurcation Lesions	43 (8.9%)
Mean SYNTAX score	325 (67.4%)
Statin	235 (48.7%)
Beta-blocker	257 (53.3%)
ACE-I/ARB	199 (41.3%)
Calcium channel blocker	99 (20.5%)
Aspirin	261 (54.1%)

AVS = Aortic Valve Sclerosis, eGFR = Estimated Glomerular Filtration Rate, BMI = Body Mass Index, CVA/TIA = Cerebrovascular Event/Transient Ischemic Attack, NSTEMI = Non ST Elevation Myocardial Infarction, STEMI = ST Elevation Myocardial Infarction, SYNTAX = Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery, ACE-I/ARB = Angiotensin Converting Enzyme Inhibitor/Angiotensin Receptor Blocker.