Risk factor profile of calcific aortic stenosis

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ABSTRACT

Background: Calcific aortic stenosis and coronary artery disease share common risk factors. In some of the previous studies statins have been used to retard the progression of aortic stenosis, but the results were inconsistent.
Methods: One hundred and ten patients of CAS above the age of 40 years have undergone clinical, biochemical and echocardiographic evaluation. Coronary angiograms were done in 66% of them.
Results: Male to female ratio was 2:1. Patients of CAS with CAD showed higher prevalence of diabetes, hypertension, dyslipidemia, smoking and family history of CAD. Prevalence of obesity and bicuspid aortic valve by echocardiogram was high in those without CAD.
Conclusions: On comparison of prevalence of risk factor in those with and without associated CAD, there was higher prevalence of diabetes (65% vs 30%), hypertension (52% vs 43%), dyslipidemia (69% vs 52%), smoking (24% vs 18%) and family history of CAD (34% vs 16%) in those with associated CAD. The incidence of obesity was higher in those without CAD (20% vs 30%). The difference observed in diabetes alone was found to be statistically significant.

1. Introduction

Calcific aortic stenosis (CAS) is the most common valve disorder in the western world[1] and is the most common indication for aortic valve replacement (AVR) in the elderly.[2] In general population, 1–2% of subjects have bicuspid aortic valve (BAV) which predisposes to early development of aortic stenosis (AS).[3] There is growing experimental evidence suggesting that aortic valve (AV) calcifications is an active biological process with some similarities to vascular atherosclerosis.[4–7]

Pomerance[8] described calcification of AV cusps that was preceded by lipid deposition similar to that seen in coronary atherosclerosis. Both atherosclerosis and CAS were found to be associated with familial hypercholesterolemia. Stewart et al.[9] from the Cardiovascular Health Study reported that independent risk factors associated with CAS included elevated LDL cholesterol and LP(a), hypertension, male gender, smoking and these risk factors

were similar to those observed with coronary artery disease (CAD) in the Framingham study. This new information opens up new avenue that can be targeted with statins in the medical management of CAS to prevent or retard the progression of CAS.[10,11] There is no data available regarding risk factor profile in patients with CAS in Indian literature. The aim of the present prospective study was to evaluate the risk factors and compare the risk factor profile in patients of CAS with and without associated CAD.

2. Material and methods

This prospective study was carried out at a tertiary hospital at Chennai between January and December 2012. One hundred and ten patients of CAS satisfying the inclusion criteria of age ≥40 years were included in the study. Informed written consent was obtained from all of them and ethics committee approval was obtained as per mandatory hospital regulation. There were 74 males (67%) and 36 females (33%). Their ages ranged between 40 and 84 years (mean age 56.2 years). The age distribution was shown in Table 1. The majority of patients were above the age of 60 years. Those with rheumatic heart disease, associated mitral valve disease, those with more than mild aortic regurgitation, atrial

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Table 1
Sex distribution in different age groups.

Age group	Male n (%)	Female n (%)	Total (n = 110)
40–49 years	8 (7.1%)	1 (0.9%)	9 (8%)
50–59 years	21 (19%)	9 (8%)	30 (27%)
60–69 years	29 (26%)	15 (14%)	44 (40%)
70–79 years	15 (14%)	10 (9%)	25 (23%)
≥80 years	1 (0.9%)	1 (0.9%)	2 (2%)

fibrillation those in clinical heart failure and those with serum creatinine more than 2 mg% were excluded from the study.

Data was recorded by taking detailed history, clinical examination and biochemical tests. The variables collected were pulse rate, blood pressure, BMI and detailed cardiovascular system examination. BMI more than 30 was considered as obese. Biochemical parameters were mainly to evaluate the risk factor profile which included routine hemogram, renal function tests, lipid profile, blood sugar levels, including glycosylated hemoglobin%. ECG, chest X-ray PA view and 2D echocardiograms (Echo) were performed in all of them. Risk factor profiles and their age groups were shown in Table 2.

2.1. Echocardiography

Echo evaluation included AV jet velocity, AV area and transaortic mean gradients. Echo evaluation also helped to detect mitral valve disease, severity of aortic regurgitation and associated mitral annular calcification. In addition echo evaluation revealed associated regional wall motion abnormalities and left ventricle ejection fraction (LVEF). Echo parameters were shown in Table 3.

2.2. Coronary angiography

It was performed in 73 patients (66%) who were subjected to AVR. When the coronary anatomy revealed more than 50% diameter stenosis they were labeled as significant coronary obstruction. Coronary artery involvement was shown in Table 4. Subgroup comparative analysis of the risk factors was done in those with and without associated CAD (Table 5).

The analysis was carried out using SPSS software version 11.0. All the categorical variables were expressed as percentages. Comparisons between categorical variables were done using Chi square test and Fisher's exact test when the number of observations were small.

3. Results

In our study we found high incidence of CAS in males compared to females. Regarding age distribution 65% of our CAS patients

Table 2
Distribution of atherosclerotic risk factors in different age groups.

Risk factors	Age groups (n = 110)				
	40–49 years (n = 9)	50–59 years (n = 30)	60–69 years (n = 44)	70–79 years (n = 25)	≥80 years (n = 2)
Diabetes mellitus	0	14	19	11	1
Systemic hypertension	1	13	22	16	2
Dyslipidemia	3	15	29	13	1
Smoking	3	5	12	4	0
Obesity	2	7	13	5	0
Family history of CAD	0	8	7	3	0
Tobacco chewing	0	0	1	0	0

Table 3
Echocardiographic parameters in our study group.

Parameters	Number of patients (n = 110)	Percentage
Ejection fraction		
≥55%	85	77.3%
45–54%	08	7.3%
30–44%	14	12.7%
<30%	03	2.7%
Aortic valve area (cm^2)		
<1.0	72	65.5%
1–1.5	38	34.5%
AV jet velocity (m/s)		
<3	01	0.9%
3–4	15	13.6%
>4	94	85.5%
Mean gradient (mmHg)		
<25	01	0.9%
25–40	09	8.2%
>40	100	90.9%
Mitral annular calcification	20	18.2%
Bicuspid Aortic valve	24	22%

Table 4
Prevalence of CAD in calcific AS (n = 73).

Coronary angiogram	Number	Percentage	RWMA by echo
Normal coronaries	44	60.3%	
Single vessel disease	09	12.3%	
Double vessel disease	10	13.7%	2
Triple vessel disease	10	13.7%	3

RWMA, regional wall motion abnormality.

were above 60 years. Majority of those above the age of 50 years had diabetes mellitus and hypertension. Our observations revealed 61 patients (55%) were dyslipidemic, 54 patients (49%) had hypertension, 45 patients (41%) had diabetes mellitus, 27 patients (25%) were obese (BMI more than 30), 24 patients (22%) were smokers and only 1 patient gave history of tobacco chewing. Family history of CAD was noted in 18 patients (16%) (Table 2). The distribution of atherosclerotic risk factors did not show any particular age preferences except that smoking was more common above the age of 50 years.

3.1. Echocardiography (Table 3)

Out of 110 patients, 24 (22%) had BAV. 85 patients (77.5%) had normal LVEF. Eight patients (7.3%) had mild LV dysfunction,

Table 5
Prevalence of risk factors in calcific AS patients with and without CAD.

Risk factor (%)	Calcific AS with CAD n = 29 (40%)	Calcific AS without CAD n = 44 (60%)	P value
Diabetes n (%)			
Yes	19 (65)	13 (30)	0.00243
No	10 (35)	31 (70)	
Hypertension			
Yes	15 (52)	19 (43)	0.4740
No	14 (48)	25 (57)	
Dyslipidemia			
Yes	20 (69)	23 (52)	0.156
No	9 (31)	21 (48)	
Smoking			
Yes	7 (24)	8 (18)	0.53
No	22 (76)	36 (82)	
Family history of CAD			
Yes	10 (34)	7 (16)	0.06
No	19 (66)	37 (84)	
Obesity			
Yes	6 (20)	13 (30)	0.398
No	23 (80)	31 (70)	