Aortic Stenosis in Elderly—A Clinical and Two-dimensional Echocardiogram Correlated Study

ABSTRACT

Introduction: Aortic valve stenosis (AS) is a common disease in elderly. The prevalence of severe AS in the general population is 2% in 72 years and increases to 8% in 85 years old. With the aging of the population, these patients will be seen more and more in clinical practice. Several clinical factors have been found to be associated with the presence and the progression of the stenosis.

Aims: To study clinical and echocardiography (ECG) profile of aortic stenosis in elderly.
To evaluate etiologies of aortic stenosis in elderly.
To study comorbidities in association with aortic stenosis in elderly.

Method: Randomized prospective study of 100 patients.

Conclusion: Though increasing age is likely to increase the degenerative changes, elderly patients of 61 to 71 years are the commonest group with aortic stenosis (symptomatic as well as asymptomatic) in the present study. Male sex is more associated with aortic sclerosis and stenosis. There are significant correlation of past smoking, and present smoking in development of aortic sclerosis and stenosis. Hypertension, coronary artery disease, diabetes mellitus are common comorbidities associated with aortic sclerosis and stenosis.

Keywords: Aortic sclerosis, Aortic stenosis, Hypertension, Left ventricular hypertrophy.

INTRODUCTION

Aortic valve stenosis (AS) is a disease of the heart valves in which the opening of the aortic valve is narrowed. The aortic valve is the valve located between the left ventricle of the heart and the aorta, the largest artery in the body, which carries the entire output of blood to the systemic circulation. Aortic valve stenosis is a common disease in elderly. The prevalence of severe AS in the general population is 2% in 72 years and increases to 8% in 85 years old. With the aging of the population these patients will be seen more and more in clinical practice. Age-related calcific (formerly termed senile or degenerative) AS of normal trileaflet valve is now the most common cause of AS in adults. 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, defined by Otto et al as irregular thickening of the aortic valve leaflets detected by echocardiography (ECG) without significant obstruction. Aortic sclerosis is the initial stage of calcific valve disease and, even in the absence of valve obstruction, is associated with a 50% increased risk of cardiovascular death and myocardial infarction. Several clinical factors have been found to be associated with the presence and the progression of the stenosis.

The stenotic process is usually gradual in onset and progression, giving the heart ample opportunity to respond. The left ventricular myocardium becomes hypertrophic, which leads to a greater pressure during systole, which in its turn forces blood past the mechanical obstruction. As a result, the cardiac output and left ventricular end-diastolic volume are maintained for a prolonged period despite the presence of a systolic pressure gradient between the left ventricle and peripheral arterial system. However, as hypertrophy continues to progress, the left ventricle becomes less compliant. Left ventricular end-diastolic pressure can become elevated even though the ventricular size remains normal.

Elderly patient with AS remains asymptomatic for a long time despite the obstruction and the pressure overload. Once the patient has developed one of the typical symptoms angina, syncope or shortness of breath, life expectancy is limited. The only possible treatment is replacement of the calcified valve by a mechanical or bioprosthesis, a major procedure in these patients. Clinical decision making, however, can be very difficult.

Though there are ample studies regarding aortic stenosis in elderly population in western countries, similar studies in Indian subcontinent are lacking.
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view of this the present study is undertaken to evaluate aortic stenosis, the common valvular disease in elderly patients which is growing exponentially.

AIMS AND OBJECTIVES

- To study clinical and echocardiographic profile of aortic stenosis in elderly.
- To evaluate etiologies of aortic stenosis in elderly (degenerative/rheumatic/congenital/other).
- To study comorbidities in association with aortic stenosis in elderly.

METHODOLOGY

Material

This prospective randomized study includes a total of 100 outpatients and inpatients from all departments, in age group of 60 years and above including both sexes.

On 1st visit:
- Enrolment of the patient
- Consent of the patient

History

Clinical examination:
- Basic lab investigations, X-ray chest and ECG
- Plan for the follow-up visits
On 2nd visit:
- Lab investigations review
- Performance of 2D ECG and color Doppler study and Interpretation of the results according to severity of aortic stenosis. (Aortic valve area and mean pressure gradient across the stenotic valve).24

Inclusion and Exclusion Criteria

Sample size: Hundred patients attending MGM Hospitals, Kamothe, as outpatients and inpatients of all wards/departments on the basis of the inclusion and exclusion criteria.

The study has been conducted for a period of 2 years from November 2012 to October 2014.

Inclusion Criteria

- Age 60 years and above
- Ejection systolic murmur in aortic area.

Exclusion Criteria

- All the patient below the age of 60 years
- Any known case of cardiomyopathy.

RESULTS

Out of total 100 patients having ejection systolic murmur in aortic area, 67 patients of aortic sclerosis and stenosis are found. In our study 33 patients (50%) are in the age group 61 to 70, 27 patients (40%) are in the age group 71 to 80 and 7 (10%) above the age above 80 years. Out of total 67 patients with aortic stenosis, 35 patients (52%) are males, 32 patients (48%) are females. Remaining 33 patients had systolic murmur at aortic area which could not be attributed to pathology at the aortic valve per se. Out of 67 patients, 23 patients had true aortic stenosis evident on ECG while other 44 patients had sclerotic aortic valve without significant obstruction (Graph 1).

In our study, 32 patients (47%) are having dyspnea as presenting symptom, 10 patients (15%) angina, 5 patients (7%), syncope respectively (Table 1). Total 39 patients (58%) are smokers, 31 patients (46%) are past smokers and 8 patients (12%) are current smokers respectively. Total 29 patients (44%) are hypertensive, 38 patients (56%) are non-hypertensive.

Eleven patients (17%) are diagnosed to have diabetes. 27 patients (40%) have coronary artery disease (CAD), 40 patients (60%) are normal. The mean high-density lipoprotein (HDL) observed is 54 with systolic dysfunction (SD) 15.3, the mean low-density lipoprotein (LDL) is 95 with SD 20.2 respectively. Seven patients (10%) have serum creatinine levels > 2, 60 patients (90%) have creatinine levels < 2 respectively. Hypertension (HT), CAD, diabetes mellitus (DM), left ventricular (LV) SD, chronic obstructive pulmonary disease (COPD), renal dysfunction is the major comorbidities associated with aortic sclerosis and stenosis in present study (Graph 2).

![Graph 1: Distribution of data by age-group of sclerosis + stenosis](image_url)

Table 1: Distribution of data by symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of cases</th>
<th>Percentage</th>
<th>p-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnea</td>
<td>32</td>
<td>47</td>
<td>0.000</td>
<td>HS</td>
</tr>
<tr>
<td>Angina</td>
<td>10</td>
<td>15</td>
<td>0.004</td>
<td>S</td>
</tr>
<tr>
<td>Syncope</td>
<td>05</td>
<td>7</td>
<td>0.06</td>
<td>NS</td>
</tr>
</tbody>
</table>

Total 47 69

HS: Highly significant; S: Significant; NS: Not significant
Mitrval regurgitation (26%) and aortic regurgitation (20%) are mainly associated valvular diseases associated with aortic sclerosis and stenosis in present study.

Out of total 23 patients of aortic stenosis, 9 patients (40%) have mild stenosis, 11 patients (47%) have moderate stenosis and 3 patients (13%) have severe stenosis. Forty patients (60%) have normal ejection fraction, 27 patients (40%) have ejection fraction < 50% (Table 2). Sixty patients (89%) have degenerative causes, 7 patients (11%) have other causes of development of aortic sclerosis and stenosis.

Echocardiography changes with left ventricular hypertrophy (LVH) and strain pattern is seen in 22 (34%) patients. Age group of the patients is compared with severity of aortic stenosis. Severe aortic stenosis is seen in 10% patients between the age 61 and 70, 11% in the age 71 and 80, 50% in above 80 (Table 3). Clinical and two-dimensional echocardiogram (2D echo) correlation shows age of patients has significant correlation with degenerative changes and development of aortic sclerosis and stenosis (p = 0.001). There is significant correlation between age of the patients and symptoms associated with aortic sclerosis and stenosis (p = 0.001), 2D echo changes and aortic sclerosis and stenosis (p = 0.001).

### DISCUSSION

Our study includes total 100 patients above the age 60 years with ejection systolic murmur in aortic area. Patients with cardiomyopathy were excluded. We found total 67 patients of aortic sclerosis and stenosis age, sex, smoking, hypertension, diabetes mellitus, CAD, serum creatinine, cholesterol, LV ejection fraction were studied as clinical factors and comorbidities associated with development of aortic sclerosis and stenosis in each patients. Causes, symptoms associated with aortic sclerosis and stenosis with their percentage distribution are studied. Two-dimensional echocardiogram findings in each patient were studied individually. Valvular heart diseases associated with aortic sclerosis and stenosis is studied. Correlation between various variables like age, 2D echo findings, and symptoms shows significant association. In our study, 17% patients are diabetic, 52% patients are hypertensive, 40% patients are affected by CAD, serum creatinine is > 2 in 10% patients, 21% are affected by chronic obstructive pulmonary disease, LV systolic dysfunction in 25% patients. The findings regarding comorbidities are consistent with the previous studies.3,5,21,23

With regard to the degree of stenosis, the moderate stenosis has been observed in 30% patients in the age group 61 to 70, 67% in the age group 70 to 80, 50% in the age group above 80. Severe stenosis has been found in 10% patients in age group of 61 to 70, 11% in age group of 71 to 80 and 50% in age group above 80. These findings are similar to findings of euro heart survey.9,10

Faggiano et al show marginal revenue (MR) in 32.5% patients, Lindroos et al show 27% patients with average revenue (AR). In our study, 26% patients above the age 75 are affected by MR, 20% with AR respectively. Sixty patients (89%) have degenerative causes, 7 patients (11%) have other causes of development of aortic sclerosis and stenosis.

Echocardiography changes with LVH and strain pattern is seen in 22 (34%) patients. Clinical and 2D echo correlation shows age of patients has significant correlation with degenerative changes and development of aortic sclerosis and stenosis (p = 0.001). There is significant correlation between age of the patients and symptoms associated with aortic sclerosis and stenosis (p = 0.001), 2D echo changes and aortic sclerosis and stenosis (p = 0.001).
CONCLUSION
The aims and objectives of our study was to study the prevalence, clinical and ECG profile of aortic stenosis in elderly. Though increasing age is likely to increase the degenerative changes, elderly patients of 61 to 71 years are the commonest group with aortic stenosis (symptomatic as well as asymptomatic) in the present study. Male sex is more associated with aortic sclerosis and stenosis. There are significant correlation of past smoking, and present smoking in development of aortic sclerosis and stenosis.

Hypertension, CAD, diabetes mellitus are common co-morbidities associated with aortic sclerosis and stenosis. High levels of HDL and LDL, S. creatinine, Low ejection fraction though associated with aortic sclerosis and stenosis in other studies, no significant role in present study is found.

Moderate and severe stenosis is commonly seen in present study. Dyspnea and angina are mainly the significant presenting symptoms. With the increase in age of the patients, there is worsening of symptoms and the severity of aortic stenosis (moderate, severe) increases as seen in present study.

Degenerative changes are the commonest etiology in development of aortic stenosis in present study. Association of smoking, mitral regurgitation, hypertension, CAD, and diabetes mellitus signifies the role of degenerative and atherosclerotic changes in presence study.

REFERENCES