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Original Article

Risk factors for degenerative aortic valve disease in India: A case control study

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ABSTRACT

Background: Degenerative aortic valve disease often co-exists with coronary artery disease (CAD) and studies done in western populations have shown that it shares the same risk factors which cause CAD. However little is known in this context among Asian Indians. The current study looks into the risk factors of degenerative aortic valve disease in Asian Indian population.

Methods: Ninety-one consecutive patients with severe aortic stenosis (AS) reporting for left heart catheterization prior to valve replacement surgery at a tertiary care centre were recruited for the study. They were compared with age and sex matched controls selected from a database of 3200 patients referred for elective diagnostic left heart catheterization for suspected CAD. Following traditional cardiovascular risk factors were assessed in all patients: age, gender, family history of CAD, smoking history, presence of diabetes, hypertension and dyslipidemia.

Results: The mean age of the study population was 57.8 ± 8.2 years (range, 40–80 years). Smoking, family history of CAD and hypercholesterolemia were significantly more prevalent in patients with degenerative AS compared to those with normal valves. No significant difference was noted in the presence of diabetes mellitus. On multivariate logistic regression, family history of premature CAD (OR 3.68; CI 1.38–9.78) smoking history (OR, 2.56; CI, 1.21–5.39), and raised LDL levels (OR, 5.55; CI, 2.63–11.69) were independently associated with the aortic stenosis patient cohort.

Conclusions: The study showed a significant association of cardiovascular risk factors with aortic stenosis independent of age and gender in Asian Indian patients.

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Introduction

Degenerative aortic valve disease (DAVD) leading to aortic stenosis (AS) is commonly noted in elderly population. It is associated with an increased risk of death due to cardiovascular causes.[1] With increasing longevity, the occurrence of DAVD in India is increasing.[2] Coronary artery disease (CAD) often co-exists with DAVD and shares the same risk factors which are responsible for coronary artery disease.[1,3–6] It is now hypothesized that this disease may be due to an active inflammatory process like atherosclerosis unlike previously held thought of age being the only risk factor responsible for it.[2–6]

However, despite there being evidence linking DAVD and atherosclerosis, these disease processes are not synonymous for only about 50% of patients with DAVD have significant CAD.[1] On the other hand, most patients with CAD do not have DAVD. A lot of work has been done in developed countries in patients with DAVD because of its high prevalence; however, no study is available from India in this group of patients. Hence there is a need to examine the relationship between cardio vascular risk factors and DAVD. In the current study we look at cardiovascular risk factors in age and sex matched patients with and without DAVD with severe aortic stenosis.

Materials and methods

Ninety-one consecutive patients of DAVD with severe aortic stenosis (AS) and a similar number of age and sex matched patients undergoing elective diagnostic coronary angiography for suspected CAD at a tertiary care hospital were included in the study.

The diagnosis of DAVD was performed on the basis of clinical criteria (absence of history of any acquired or congenital valvular heart disease) and on the echocardiographic findings of morphological changes suggestive of AS (thickened aortic cusps with reduced systolic opening). Severe AS was defined as the aortic valve area <0.75 cm^2 calculated using continuity equation.[7] Peak and mean gradients of >64 mmHg and >50mmHg respectively were also used to define severe AS. Patients with moderate AS, severe aortic regurgitation and other valvular lesion were excluded from the study. Cases were pair matched for age and gender with those without aortic valve disease out of a pool patients referred for elective diagnostic coronary angiogram for suspected CAD. Written consent was taken from all the patients for participating in the study.

Coronary angiography

Coronary angiography was performed in all the patients in order to define the extent and severity of disease. At least 70% reduction in the diameter of major epicardial coronary arteries [left anterior descending (LAD) or left circumflex (LCx) or right coronary artery (RCA)] and their branches was used as definition of significant coronary artery disease. In the case of left main coronary artery (LMCA) the definition was revised to include cases which had 50% reduction of the luminal diameter. Depending on coronary angiogram patients were classified into those with or without significant CAD. In those with obstructive coronary lesions the extent of disease was further classified into single vessel, double vessel or triple vessel disease based on the number of coronary arteries affected.

Patient characteristics

The medical records of cases and controls were reviewed for the cardiovascular risk factors which included age, gender, family history of premature CAD, smoking history, presence of diabetes mellitus and hypertension. A complete lipid profile was done to record total cholesterol (TC), triglycerides (TG), low-density lipoproteins (LDL) and high-density lipoproteins (HDL) prior to the coronary angiogram. American college of cardiology criteria was used to diagnose dyslipidemia.[8] Diagnosis of diabetes mellitus (DM) was made if the fasting glucose was >126 mg/dL, or if the patient was already on treatment for same. Patients with either systolic pressure >140 mmHg and/or diastolic pressure >90 mmHg were classified as hypertensive while history of smoking was defined as >10 pack-years of smoking. Body mass index (BMI) was computed for all patients and obesity was defined as BMI >30 kg/m^2. Family history of premature CAD was defined as disease first degree male relative of <55 years and first degree female relative of <65 years of age.

Statistical analysis

Demographic and clinical characteristics are presented as mean $\pm$ standard deviation (SD) or as proportions as appropriate. An independent *t*-test was used for continuous variables and Chi-square test for categorical variables. Conditional logistic regression adjusted for matching variables (age, gender) were used to calculate the odds ratios (OR) along with their 95% confidence intervals (CI). Multivariable logistic regression was performed to identify independent predictors of DAVD. A p value of <0.05 was considered significant. SAS software package version 9.2, SAS Institute, Cary was used for analysis.

Results

The study population consisted of 91 patients of DAVD with severe AS; the mean age of study population was 57.7 ± 8.3 years (range, 40–80 years). The traditional coronary risk factors of the study population are as given in Table 1. Majority of the study population was male (71.4%). Significant CAD was diagnosed in 24.2% of patients with DAVD.

In patients with DAVD dyslipidemia, (elevated cholesterol, elevated LDL and low HDL levels) history of smoking, and family history of premature CAD were significantly more prevalent than controls ($p < 0.01$). No significant difference was noted in the presence of diabetes and the levels of triglycerides. Hypertension was significantly higher in the controls compared to the cases ($p = 0.06$).

When limiting the analysis to patients with DAVD with normal coronaries, dyslipidemia (elevated cholesterol,

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