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Prevalence of Coronary Artery disease in Patients undergoing Non Coronary Cardiac Surgery: A Single Center Study

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Abstract

Objectives: to evaluate the prevalence of significant coronary artery disease (CAD) in patients referred for open heart surgery for various valvular and non valvular etiologies.

Methods and materials: a total of 160 patients (73 males and 87 females) were included in this study: old age, male gender, hypertension (HT), diabetes mellitus (DM), hyperlipidemia, smoking and left ventricular (LV) systolic dysfunction are recorded as risk factors for CAD. Of the 160 patients: 143 (89.4 %) have valvular disease (VHD) and 17 (10.6%) have non valvular disease. Patients with VHD were classified according to valve lesions into: mitral stenosis (MS), mitral regurgitation (MR), aortic stenosis (AS), aortic regurgitation (AR), tricuspid regurgitation (TR) and mixed valvular disease. Correlation between various types of valve diseases and CAD are assessed.

Results: CAD were detected in 26.9% (43) of patients. Old age, HT, DM, hyperlipidemia and smoking were significantly correlated with CAD. CAD were more common in patients with VHD than non VHD. 25(50%) patients with AS have significant CAD (P value= 0.0001), in patients with MR: 8(12.7%) have significant CAD, while patients with MS and AR were have CAD in 15.1% and 25% respectively. Among patients with non valvular heart disease (17 patients): 13 patients have atrial septal defect and 4 patients have atrial myxoma. 3 patients (6.1%) have significant CAD (P value=0.2), one of them had HT, DM and smoker man presented with chest pain on exertion.

Conclusion: Obstructive CAD were more common in patients with AS and MR and higher in patients with risk factors for CAD.

Key words: *coronary artery disease, valvular heart disease, Aortic stenosis.*

Introduction

Many patients referred for surgical correction of valvular and non valvular heart disease have concomitant asymptomatic coronary artery disease (CAD)(1). Lytle et al. (2), and Karp et al (3) observed and recommend that complete revascularization is superior to no revascularization in patients with valvular heart disease and CAD. In such patients valve replacement and CABG is associated with A significant reduction in mortality, Therefore, it is desirable to identify CAD in patients presenting for valve surgery. Coronary angiography (CAG) remains the gold standard for identifying such patients (4). Due to its high negative predictive value, coronary CT angiography to exclude CAD may be an option in patients with low or intermediate pretest probability of CAD (5).

According to the American College of Cardiology/ American Heart Association (ACC/AHA) guideline

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for the Management of Patients with Valvular Heart Disease (5) it is class I indication to perform coronary angiography before valve intervention in patients with symptoms of angina, objective evidence of ischemia, decreased LV systolic function, history of CAD, or coronary risk factors (including men age >40 years and postmenopausal women).

In our center coronary angiography is usually performed routinely in any patient more than 40 years of age before cardiac valvular and non valvular surgery, this study aims to identify prevalence of coronary artery disease in patients with various valvular and non valvular scheduled for open heart surgery.

Patients and Method

This study includes 160 patients with age ≥ 40 years and various cardiac valvular and non-valvular diseases referred for heart surgery between October 2016 and January 2019 at ibn – albittar cardiac center, Baghdad, Iraq. Valvular heart diseases included rheumatic heart disease, mitral stenosis (MS), mitral valve prolapse (MVP), sclerotic aortic valve disease and bicuspid aortic valve (BAV). Non-valvular cases included atrial septal defect (ASD) and atrial myxoma. Patients with known case of CAD, prior CABG or percutaneous coronary intervention or age <40 years were excluded from the study.

Detailed assessment of symptoms such as chest pain, dyspnea, syncope, and fatigue and of risk factors like hypertension (HT), diabetes mellitus (DM), smoking and dyslipidemia was done in all patients. Etiology of cardiac disease was evaluated by transthoracic and if required, transesophageal echocardiogram with two dimensional and color flow imaging. All selected patients underwent coronary angiography and angiographic data was collected and assessed by at least two interventional cardiologist for presence or absence of significant coronary artery stenosis (defined as ≥ 50% luminal narrowing of left main coronary artery, and ≥ 70% narrowing for other coronary tree) and number of coronaries involved, decision made after discussion with cardiac surgeon to perform valvular surgery only or revascularization plus valvular surgery, then patients referred to surgical department.

Statistical Analysis

Statistical analysis was performed using SPSS 22.0 software (SPSS Inc., Chicago, IL, USA). Continuous variables are presented as mean ± standard deviation (SD). Means were compared using Student's ttests. Pearson Chisquare and Fisher's exact test were used to analyze differences in categorical variables. a P-value of < 0.05 was considered statistically significant.

Results

Table 1: Baseline characteristic of patients:

Age(year) ±SD	**56,1 ± 9.8(y)**
Gender, n(%) Male, n(%) Female, n(%)	 73(45,6%) 87(54,4%)
Hypertension, n(%)	72(45%)
DM, n(%)	44(27,5%)
Hyperlipidemia, n(%)	18(11.25%)
Smoking, n(%)	16(10%)
LV dysfunction, n(%)	7 (4,4%)
Valvular heart disease, n(%) - Mitral Stenosis, n(%) - Mitral Regurgitation, n(%) - Aortic Stenosis, n(%) - Aortic Regurgitation, n(%) - Tricuspid Regurgitation, n(%) - Mixed valvular heart disease, n(%)	143(89.4%) 33(20.6%) 63(39.4%) 50(31.3%) 24(15%) 2(1.3%) 29
Non valvular heart disease, n(%)	17(10.6%)
Coronary angiography: **No Significant CAD:** **Significant CAD:** - **single vessel disease:** - **2 vessel disease:** - **3 vessel disease:** - **LMS lesion:**	 117 (73.1%) 43(26.9%) 24(55.8%) 7(16.2%) 11(25.6%) 1(2.3%)

Table 2: Correlation between coronary artery disease and risk factors:

Risk factors	Total	Coronary angiography		P value
		CAD	No CAD	
Male gender, n(%)	73(45.6%)	30(41%)	43(59%)	0.0001
DM, n(%)	44(27.5%)	17(38.6%)	27(61.3%)	0.033
HT, n(%)	72(45%)	25(34.7%)	47(65.2%)	0.033
Hyperlipidemia, n(%)	18(11.25%)	7(38.9%)	11(61.1%)	0.02
Smoking, n(%)	16(10%)	11(68.7%)	5(31.2%)	0.0001
LV dysfunction, n(%)	7(4%)	2(28.6%)	5(71.4%)	0.6

CAD: coronary artery disease, DM: diabetes mellitus, HT: hypertension, LV: left ventricle. P value <0.05 is significant

This table showing the correlation between variable risk factors for atherosclerosis and prevalence of CAD, 30 males (41%) out of 73 males have CAD with P value= 0.0001. DM found in 44 (27.5%) of patients, 17 (38.6%) of them have significant CAD (P value =0.03). 72 patients had HT, 25 (34.7%) have CAD. Hyperlipidemia detected in 18 patients, 38.9% of them have CAD (P value= 0.02). 68% of smokers have significant CAD (P value= 0.0001)

Table 3: Correlation between coronary artery disease and indications for cardiac surgery:

	coronary angiography		Total	P value
	CAD	No CAD		
Mitral stenosis	5(15.1%)	28	33	0.065
Mitral regurgitation	8(12.7%)	55	63	0.001
Aortic stenosis	25(50%)	25	50	0.0001
Aortic regurgitation	6(25%)	18	24	0.5
Tricuspid regurgitation	2(100%)	0	2	0.07
Mixed valvular disease	6(22.2%)	21	27	0.3
Nonvalvular	3(17.6%)	14	17	0.27

CAD: coronary artery disease. P value <0.05 is significant.

This table show that CAD is most correlated with aortic stenosis (50%) with significant P value (0.0001) most of cases are due to degenerative sclerosis of aortic valve and associated with increasing age, 8 cases of mitral regurgitation have significant CAD (12.7%) with P value =0.001, while mitral stenosis which is mainly rheumatic in origin (15.1% with P value= 0.06), aortic regurgitation (25%, P value=0.5) are not significantly associated with CAD.

The two cases of TR have CAD, one of them was diabetic and treated with endocarditis of TV and then referred for surgery, second patient had sever TR secondary to sever rheumatic MS (mixed valvular disease).

Among patients with non valvular heart disease (17 patients): 13 patients have atrial septal defect and 4 patients have atrial myxoma. 3 patients (17.6%) have

significant CAD (P value=0.2), one of them had HT, DM and smoker man presented with chest pain on exertion.

Discussion

The prevalence of coronary artery disease among patients undergoing non coronary cardiac surgery range between 8.7 to 42.6% [1,6-8], and this associated with increases perioperative and postoperative morbidity and mortality if revascularization not done at same time during non coronary cardiac surgery, in our study we found that the overall prevalence of CAD is 26.9% (43 patients) among patients assessed by coronary angiography before cardiac surgery and this is comparable to Ayaz H. Shaikh et al, who showed in his retrospective study that ,Out of 144 patients, 99 (68.8%) found to have <50% coronary stenosis and remaining 45 (31.3%) had > 50% stenosis(9).

Ganesh N et al found that the incidence of coronary artery disease was 25% among patients with rheumatic heart disease referred for valvular cardiac surgery (8).

CAD was significantly higher in male gender, in association with DM, HT, smoking and hyperlipidemia and this is consistent with Jose G. et al (7), Deepak K. et al (10) and Cholenahally N. Manjunath et al (1) all mentioned that among patients with CAD the presence of increasing age, male gender, DM, HT, dyslipidemia and smoking were significantly greater as compared to those with normal coronaries.

In our study the presence of LV systolic dysfunction was not found to be correlated significantly with CAD (P value= 0.6) and this may be due to low number of cases (just 7 cases with LV systolic dysfunction versus 154 patients with normal LV systolic function).

The prevalence of CAD is higher in patients with valvular than patients with non valvular heart disease (27.9% Vs 17.6%) and this is consistent with Cholenahally et al (1) who found that among 300 patients CAD was found in 26 (8.7%) and CAD was more common in patients with valvular heart disease (9.3%) as compared with non valvular heart disease (3.3%).

The most common cause of aortic stenosis in adults is age related aortic sclerosis and calcification (11), atherosclerosis plays an important role in progression of aortic calcification and development of CAD. And explain the high incidence of CAD in patients with AS in our study (50%, P value= 0.0001). 8(12.7%) patients with mitral regurgitation have CAD (P value= 0.001), CAD was detected in 5(15.1%) of patients with MS (P value= 0.06), AR is least correlated with CAD (6 patients with P value =0.5) and this consistent with Zeynep Y. Emren et al found that among 241 patients: Coronary artery disease was detected in 26.4% of patients with mitral stenosis and 57.7% of patients with aortic stenosis. Of the patients with mitral insufficiency, 41.9% had CAD, and 44.4% of the patients with aortic insufficiency had CAD (6).

Sonmez et al. (12) evaluated 760 patients who underwent valvular heart surgery, and they found occlusive CAD in 15.8% of the patients ($p < 0.001$), and the highest prevalence rate was noted in patients with AS ($p < 0.05$), a finding similar to that reported in the present study.

Conclusion

This study provide an idea about the prevalence of CAD among patients referred for non coronary cardiac surgery in our locality, although small sample used but it provided us with the high prevalence of CAD (26.9%) among those patients, and CAD is more frequent among patients with AS and in patients with multiple risk factors for atherosclerosis.

Conflict of Interest: (nil – There are "NO CONFLICT OF INTEREST")**.**

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Ethical Clearance: Committee members are approved to perform a study about:

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