



FREQUENCY OF OBSTRUCTIVE CORONARY ARTERY DISEASE IN PATIENTS UNDERGOING VALVULAR HEART DISEASE SURGERY.

1. MBBS, FCPS (Medicine), FCPS (Cardiology)
Assistant Professor Cardiology
Faisalabad Institute of Cardiology, Faisalabad.
2. MBBS, MCPS (Medicine), FCPS (Cardiology)
Assistant Professor Cardiology
Faisalabad Institute of Cardiology, Faisalabad.
3. MBBS, FCPS (Medicine), FCPS (Cardiology)
Associate Professor Cardiology
Faisalabad Institute of Cardiology, Faisalabad.
4. MBBS
PGR FCPS (Cardiology)
Faisalabad Institute of Cardiology, Faisalabad.
5. MBBS, FCPS (Cardiology)
Senior Registrar Cardiology
Faisalabad Institute of Cardiology, Faisalabad.
6. MBBS, FCPS (Cardiology)
Senior Registrar Cardiology
Faisalabad Institute of Cardiology, Faisalabad.

Correspondence Address:

Dr. Munir Ahmad
FCPS (Medicine), FCPS (Cardiology)
Assistant Professor Cardiology
Faisalabad Institute of Cardiology,
Faisalabad.
drmunir2000@hotmail.com

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Munir Ahmad¹, Muhammad Yasir², Muhammad Hamid Saeed³, Muhammad Saeed Ali Khan⁴, Qasim Rauf⁵, Naeem Hameed⁶

ABSTRACT... Objectives: To determine the frequency of obstructive coronary artery disease in patients undergoing valvular heart disease surgery. **Study Design:** Cross-sectional study. **Setting:** Department of Cardiology, Faisalabad Institute of Cardiology, Faisalabad. **Period:** Ten months, from 02 February, 2017 to 02 November, 2017. **Material & Methods:** After taking approval from hospital ethical committee, patients coming through outpatient department who fulfilled the inclusion criteria were enrolled and informed consent was taken from them. History of smoking, diabetes mellitus, renal dysfunction, dyslipidemia, hypertension and family history of coronary artery disease was assessed. Coronary angiography was performed by senior consultant interventional cardiologist for assessing obstructive coronary artery disease as per operational definition. All the information was collected on prespecified Performa. **Results:** In this study, out of 140 cases of valvular heart disease (VHD), 47.14%(n=66) were between 30-50 years of age whereas 52.86%(n=74) were between 51-70 years of age, mean \pm sd was calculated as 51.71 ± 9.09 years, 57.14%(n=80) were male while 42.86%(n=60) were female, frequency of obstructive coronary artery disease in patients undergoing valvular heart surgery was recorded as 29.3% (n=41) whereas 70.7% (n=99) had no such finding. **Conclusion:** The frequency of obstructive coronary artery disease was (29.3%) in patients undergoing valvular heart disease surgery. However, coronary artery disease was less frequent in rheumatic as compared to degenerative heart valve disease.

Key words: Degenerative Valve Disease, Obstructive Coronary Artery Disease, Rheumatic Heart Disease, Valvular Heart Disease, Valvular Heart Disease Surgery.

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INTRODUCTION

Valvular Heart Disease (VHD) is prevailing cardiovascular health problem after hypertension and coronary artery disease.¹ VHD is a progressive disorder characterized by thickening, fibrosis and calcification of valvular apparatus producing either narrowing or regurgitation and sometimes combined valvular lesions often requiring surgery when severe and/or symptomatic.² VHD is one of the major causes of cardiovascular morbidity and mortality worldwide with an enormous burden on healthcare resources.³ There are various etiologies of VHD such as rheumatic, degenerative, infectious, congenital, and traumatic. There is worldwide change in the epidemiology of VHD in the past century.⁴ VHD remains common in developing countries due to high prevalence of

rheumatic fever in the population.^{4,5} In Pakistan² rheumatic fever prevalence is 22/1000 that has placed Pakistan among one of the top list countries in the world.⁶

Age related degenerative valve disease (DVD) is common in developed countries particularly in the older population as a result of improvement in life expectancy.⁷ Patients of VHD going for surgery may have concomitant asymptomatic obstructive CAD. In a study by Morrison et al⁹, asymptomatic significant coronary CAD was detected in (33%) of patients undergoing VHD surgery. In developed countries 9-41% patients planned for VHD surgery may have concurrent obstructive CAD.⁸ For example in a study by Lappe et al¹⁰ obstructive coronary artery disease

was reported in 19.3% of patients who underwent valvular heart disease surgery.

The results of combined coronary artery bypass graft (CABG) surgery for coexistent CAD in patients going for VHD surgery are better than valve alone surgery. It has been seen that mortality is significantly reduced with combined CABG and valve surgery.¹¹ This makes preoperative documentation of CAD one of the paramount importance due to impact of untreated CAD on perioperative and long-term survival.¹² American Heart Association / American College of Cardiology (AHA/ACC)¹³ guidelines recommend coronary angiography before heart valve surgery in men and women aged > 35 years having coronary risk factors or with angina symptoms and in postmenopausal women even without coronary risk factors.

There is robust data for coexistent CAD in patients of VHD planned for valvular heart disease surgery in developed countries while there is very little data available in Pakistani population to the best of our knowledge. The aim of the present study was to determine the frequency of obstructive coronary artery disease in patients going for valvular heart disease surgery.

Obstructive Coronary Artery Disease

- It was defined as $\geq 50\%$ of stenosis in ≥ 1 artery on coronary angiography.

MATERIAL & METHODS

Study design: Cross-sectional study

Setting: Department of Cardiology, Faisalabad Institute of Cardiology, Faisalabad

Period: Ten months, from 02 February, 2017 to 02 November, 2017.

Sample size: By using WHO sample size calculator:

$$P = 19.3\% \times 10$$

$$\text{Confidence level} = 95\%$$

$$\text{Absolute precision required} = 9.5\%$$

$$\text{Sample size} = 140$$

Sampling technique:

Non-probability consecutive sampling

Inclusion Criteria

1. Patients of either gender with age between 30-70 years.
2. Patients undergoing valvular heart disease surgery.
3. Patients with documented history of any co morbidities (like diabetes mellitus, dyslipidemia, smoking, Family history of coronary artery disease, hypertension).

Exclusion Criteria

1. Patients received administration of nonsteroidal anti-inflammatory drugs, amino glycosides one week before angiography.
2. Patients of renal failure (serum creatinine >1.5md/dl)
3. Patients with an active infection and/or bleeding disorder.

After taking approval from hospital ethical committee, patients coming through the OPD of the department who fulfilled the inclusion criteria were enrolled and informed consent was taken from them. Contributory factors like smoking, diabetes mellitus, renal dysfunction, dyslipidemia and family history of coronary artery disease was assessed and patients having documented history of all or any of these was documented. Coronary angiography was performed by senior consultant cardiologist for assessing obstructive coronary artery disease as per operational definition. All the information was collected on prescribed proforma.

All the data was entered in SPSS V-20. Mean and standard deviation was calculated for all quantitative variables like age. Frequency and percentage was calculated for all qualitative variables like gender, smoking, diabetes mellitus, renal dysfunction, dyslipidemia, family history of coronary artery disease and obstructive coronary artery disease. Effect modifiers like age, gender, smoking, diabetes mellitus, renal dysfunction, dyslipidemia and family history of coronary artery disease was controlled by stratification. Post-stratification chi-square test was applied. P-value

≤ 0.05 was taken as significant.

RESULTS

We enrolled one hundred and forty (140) cases in this study to determine the frequency of concomitant obstructive coronary artery disease in patients undergoing valvular heart surgery.

Age distribution of the patients showed 47.14% (n=66) patients were between 30-50 years of age whereas 52.86% (n=74) were between 51-70 years of age, mean ± sd was calculated as 51.71 ± 9.09 years. There were 80 males (42.86%) and 60 females (57.14%). There were 62 (44.28) smokers, 41 (29.24%) diabetics, and 56 (40%) hypertensives in this study while dyslipidemia was found in 36 (27.72%) and 36 (25.72%) patients were found to have family history of coronary artery disease. Out of 140 cases, 92 (70%) underwent mitral valve replacement, 40 (24.2%) aortic valve replacement and 8 (5.8%) patient had double valve replacement done (Table-I).

Frequency of obstructive coronary artery disease in patients undergoing valvular heart surgery was recorded as 29.3 % (n=41) whereas 70.7 % (n=99) had no such finding (Table-II). Obstructive coronary artery disease was detected in 22(22.4%) patients of rheumatic heart disease. Out of these 22 cases of rheumatic heart disease, 14(63.7%) had mitral, 6 (27.2%) aortic valve replacement while only 2 (9.1%) patients underwent double valve replacement (Table-II).

Effect modifiers like age, gender, smoking, diabetes mellitus, hypertension, dyslipidemia and family history of coronary artery disease were controlled by stratification. Post-stratification chi-square test was applied. P-value ≤ 0.05 was taken as significant (Table-III).

Characteristic	Mean+sd 51.71+9.09
Age (year)	N (%)
Male	80 (57.14)
Female	60 (42.86)
Smoking	62 (44.28)
Hypertension	56 (40)
Diabetes	41 (29.2)
Dyslipidemia	36 (25.7)
Family History of CAD	
Etiology	
Rheumatic	98 (70.0)
Degenerative	34 (24.3)
Myxomatous	4 (2.9)
Bicuspid aortic valve	2 (1.4)
Infective endocarditis	2 (1.4)
Valve replaced	
MVR	92 (70)
AVR	40 (24.2)
DVR	8 (5.8)

Table-I. Baseline characteristics of patients (n=140)
MVR: Mitral valve replacement, AVR: Aortic valve replacement, DVR: Double valve replacement, CAD: coronary artery disease

Angiographic disease		
<50 % coronary stenosis	99	70.7
≥ 50% coronary stenosis	41	29.3
Obstructive CAD in patients with RHD:		
Valve replaced		
≥ 50% coronary stenosis		
MVR	AVR	DVR
14(63.7%)	6(27.2%)	2(9.1%)
Total		
22(22.4%)		

Table-II. Angiographic data (n=140)
CAD: coronary artery disease, RHD: rheumatic heart disease

Variable		Patients with CAD	Patients without CAD	P-Value
Hypertension	Yes	36	20	0.12
	No	16	68	
Diabetes	Yes	20	21	0.25
	No	22	77	
Smoking	Yes	24	38	0.07
	No	10	68	
Dyslipidemia	Yes	20	16	0.22
	No	14	90	
F/H of CAD	Yes	16	26	0.28
	No	18	80	
Age				0.26
30-50 years		15	51	
51-70 years		24	50	
Gender				0.68
Male		24	56	
Female		17	43	

Table-III. Stratification for frequency of obstructive coronary artery disease in patients undergoing valvular heart surgery (n=140)

F/H: Family history, CAD: Coronary artery disease

DISCUSSION

Prevalence of VHD related to degenerative valve disease is growing up in developed countries due to which it has been given the title of “next cardiac epidemic”.¹⁴ This is particularly related to the increase in life span seen in developed countries.¹⁵ However in developing world majority of the cases of VHD are related to rheumatic heart disease due to high prevalence of rheumatic fever.⁶ Coronary artery disease (CAD) may coexist in VHD patients.⁹ According to heart disease and stroke statistics majority of cardiovascular events are related to these two entities.¹⁶ In patients of VHD being considered for surgery the coexistent CAD needs to be addressed by CABG surgery in the same sitting because of the impact of untreated CAD on perioperative and long term survival outcome. Results of combined CABG and VHD surgery have shown better regarding short and long term outcomes.¹⁷⁻¹⁸ This mandates preoperative diagnosis of concurrent CAD in VHD patients and the gold standard for evaluation of CAD is invasive coronary angiography.⁹

Obstructive coronary artery disease in patients of valvular heart disease has been reported to vary

from 9%-41% in different studies.^{8-9,19} In a recent large study involving 1308 patients by Anthony Matta and Nicolas Moussallemin Lebanese population has reported an overall prevalence for concurrent obstructive CAD of 27.75% in their patients who underwent heart valve surgery.²⁰ In Pakistan studies by Shaikh et al²¹ and Gul et al²² has reported overall prevalence of obstructive CAD of 31% respectively in their population cohorts. In the present study overall 29.3% (n=41) patients undergoing VHD were found to have obstructive CAD that coincides with the results of above local and international data.

The prevalence of obstructive CAD in patients of RHD is low and ranges between 4-14%.²³⁻²⁵ In Pakistan study by Shaikh et al²¹ reported obstructive CAD in 25% of patients with RHD while in another study in Pakistan by Gul et al²² reported obstructive CAD in 18.2% of study population with RHD undergoing surgery for valve replacement. Similarly Bozbas et al²⁶ has reported a prevalence of 18.8% regarding obstructive CAD in patients of RHD. In our study, patients of RHD obstructive CAD was detected in 22 (22.4%) patients which is similar to the above stated studies results. The

low prevalence for CAD in RHD patients may be related to their young age, female gender and low socioeconomic class and relative absence of coronary artery disease risk factors.

The prevalence of CAD in patients of DVD is high which is related to advanced age, male gender and presence of coronary risk factors in these patients. Pathogenesis of DVD and CAD shares common mechanism because both involve a process including lipid deposition, inflammation and calcification.²⁷⁻²⁸ In present study, most of the patients with DVD were male, older and many had coronary risk factors which is similar to other studies.²⁹⁻³⁰ We detected obstructive CAD in 46.3% patients with DVD planned for surgery which is similar to results by Emren et al³¹ and Lacy et al.³² Similarly studies by Shaikh et al and Gul et al has reported a prevalence of 31.9% and 43.3% respectively.

In present study patients with RHD outnumbered patients of degenerative valve disease while obstructive CAD was less frequent in RHD as compared to degenerative VHD. This finding mandates the need for creation of separate guidelines for developing countries for preoperative coronary angiography because guidelines by ACC/AHA mainly address the patients with degenerative valvular heart disease. Furthermore these guidelines have level of evidence "C" meaning that they have been based on limited studies or expert opinion which further mandates the need for studies on larger scale.

CONCLUSION

The frequency of obstructive coronary artery disease was (29.3%) in patients undergoing valvular heart disease surgery. However, coronary artery disease was less frequent in rheumatic heart disease as compared to degenerative valvular heart disease.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Munir Ahmad	Manuscript writing.	
2	Muhammad Yasir	Data analysis.	
3	M. Hamid Saeed	Editing.	
4	M. Saeed Ali Khan	Data collection.	
5	Qasim Rauf	References.	
6	Naeem Hameed	Proof reading.	