

Original paper

Correlation of Pulmonary Hypertension and Severity of Mitral Stenosis

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Abstract

Aim of study: The aim of study is to define the correlation between mitral valve stenosis and its predictors of severity as pulmonary hypertension and other cardiac valves lesions.

Material and Methods: This study that enrolled total 80 patients, 25 males and 55 females and their age range from 15 to 60 years old , with male to female ratio 1:2.2 . The study was conducted in Al sadder teaching hospital in Al Najaf governorate during the period from May 2012 to May 2013. Echocardiography was done for all patients to assess mitral valve area by planimetry, detect other valves lesion and assess right ventricular systolic pressure which is equal to pulmonary artery systolic pressure (PASP) .

Results & Discussion: This study showed that the increased incidence of moderate to severe mitral stenosis in female as compared with male and there were no statistically significant difference between age groups. There was statistically significant correlation between severities of mitral valve stenosis with increased systolic pressure of pulmonary artery since the more severe mitral stenosis, as the higher pulmonary hypertension. There were no statistically significant correlation between mitral stenosis severity and other cardiac valves. There were statistically significant correlations between pulmonary hypertension and tricuspid regurgitation with or without mitral regurgitation.

There were increased incidence of moderate to severe mitral stenosis in female as compared with male and there were no statistically significant difference between age groups. There were statistically significant correlation between severity of mitral valve stenosis with increased systolic pressure of pulmonary artery since the more severe mitral stenosis. There were statistically significant correlations between pulmonary hypertension and tricuspid regurgitation .

Conclusions: The predictors for mitral stenosis severity in this study that female, younger than 40 years old, echocardiographic evidence of pulmonary hypertension and tricuspid regurgitation with or without mitral regurgitation.

Recommendation: We recommended that follow up all patients with mitral valve stenosis by pulmonary artery systolic pressure measured by echocardiography.

Key words: MS (mitral stenosis), PASP (Pulmonary artery systolic pressure),TR (Tricuspid Regurgitation), MR (Mitral Regurgitation), AR (Aortic Regurgitation)

Introduction

The predominant cause of mitral stenosis (MS) is rheumatic fever.⁽¹⁾ Two thirds of all patients with rheumatic MS are female. About 25 percent of all patients with rheumatic heart disease have isolated MS, and about 40 percent have

combined MS and mitral regurgitation (MR). Multivalve involvement is seen in 38 percent of MS patients, with the aortic valve affected in about 35 percent and the tricuspid valve in about 6 percent. The pulmonic valve is rarely affected.⁽²⁾ Echocardiography is the most accurate approach to diagnosis and evaluation of

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MS.⁽³⁾Echocardiography is recommended in all patients with MS at initial presentation, for reevaluation of changing symptoms or signs, and at regular intervals (depending on disease severity) for monitoring disease progression.⁽⁴⁾ Mitral valve area is measured by direct planimetry from 2D short axis images and calculated by the Doppler pressure half-time method. The transmitral gradient is also calculated and any coexisting MR is quantitated on the basis of the accepted guidelines. Evaluation of the morphology of the valve is key in predicting the hemodynamic results and outcome of percutaneous BMV.⁽⁵⁾Evaluation of the morphology of the valve is key in predicting the hemodynamic results and outcome of percutaneous BMV. A score of 0 to 4+ is given for leaflet thickness, mobility, calcification, and chordal involvement to provide an overall score that is favorable (low) or unfavorable (high) for valvuloplasty. Other important anatomical features of the valve are the degree of anterior leaflet doming, the symmetry of commissural fusion, and the distribution of leaflet calcification. The severity of mitral stenosis based on MV area as mild if MVA>1.5 cm, moderate if MVA 1.5-1 cm and severe if MVA<1 cm.

Pulmonary hypertension⁽⁶⁾: can be categorized as mild, moderate, or severe based on pulmonary arterial systolic pressure (PASP) measuring 40–45 mmHg, 46–60 mmHg, or more than 60 mmHg, respectively.

The PASP is measured using the simplified Bernoulli equation applied to peak TR velocity by continuous wave doppler.

To this value, right atrial pressure (RAP) should be added to complete the calculation as followings;

$$\text{PASP} = 4(\text{Tricuspid Velocity})^2 + \text{RAP}$$

Severe mitral stenosis by echocardiography is defined as follows:

1. Resting mean pressure gradient is greater than or equal to 10 mmHg

2. Mitral valve area is less than or equal to 1cm²
3. Pressure half-time is greater than or equal to 220 ms.⁽⁶⁾

Aims of the Study: To analyze patients with mitral stenosis and to correlate mitral valve area with gender, age, echocardiographic findings of pulmonary arterial systolic pressure (PASP) and other associated valves lesions.

Patients and Methods

This cohort study that enrolled total 80 patients were included in the study, 25 males and 55 females where resident in Al Najaf Governorate and their age range from 15 to 60 years old , with male to female ratio 1:2.2 . The study was conducted in Al sadder teaching hospital in Al Najaf governorate during the period from May 2012 to May 2013. Echocardiography was done for all patients to assess mitral valve area by planimetry, detect other valves lesion and assess right ventricular systolic pressure which is equal to pulmonary artery systolic pressure (PASP) . Patients with left atrial outflow obstruction as left atrial myxoma or vegetation or abscess and prosthetic mitral valve stenosis were excluded from the study.

Statistical Analysis: Data were coded and fed on computer. Analysis was done on SPSS version 15, for determination of statistical significance among different variables. A p-value of less than 0.05 was considered as significant and calculated by method of Pearson Chi square equation.

Results

The tables showed that the increased incidence of moderate to severe mitral stenosis in female as compared with male and there were no statistically significant difference between age groups. There were statistically significant correlation between

severity of mitral valve stenosis with increased systolic pressure of pulmonary artery since the more severe mitral stenosis ,the more highpulmonary hypertension

(p=0.000) . There were no statistically significant correlation between mitral stenosis severity and other cardiac valves.

Table1. Demographic distribution of severity of mitral stenosis among variables

variables		Mitral valve areas			P= value
		Mild MS >1.5 cm	Moderate MS 1.5-1 cm	Severe MS <1 cm	
Sex	Male	9 (36%)	10 (40%)	6 (24%)	0.11
	Female	9 (16.4%)	24 (43.6%)	22 (40%)	
Age	20-29 years	3 (10.7%)	12 (42.9%)	13 (46.4%)	0.36
	30-39 years	9 (28.1%)	14 (43.8%)	9 (28.1%)	
	More than 40 years	6 (30%)	8 (40%)	6 (30%)	
PASP	NORMAL	12 (52.2%)	8 (34.8%)	3 (13%)	0.000
	Pulmonary HTN	6 (10.5%)	26 (45.6%)	25 (43.9%)	
TR		17 (23.6%)	28 (38.9%)	27 (37.5%)	0.143
MR		10 (35.7%)	12 (42.9%)	6 (21.4%)	0.06
AR		7 (25%)	12 (42.9%)	9 (32.1%)	0.89

MS (mitral stenosis),PASP(Pulmonary artery systolic pressure), TR (Tricuspid Regurgitation), MR (Mitral Regurgitation), AR (Aortic Regurgitation), HTN (Hypertension).

There were statistically significant difference between patient with moderate and severe MS with MS (mitral stenosis),PASP(Pulmonary artery systolic pressure),TR (Tricuspid Regurgitation), MR (Mitral Regurgitation), AR (Aortic Regurgitation), HTN (Hypertension)

There were statistically significant correlations between pulmonary hypertension and tricuspidregurgitation with or without mitral regurgitation (p=0.000) .

There were increased incidence of moderate to severe mitral stenosis in female as compared with male and there were no statistically significant difference between age groups. These results were consistent with Diana R. et tal ⁽⁷⁾. There were statistically significant correlation between severity of mitral valve stenosis with increased systolic pressure of pulmonary artery since the more severe mitral stenosis, the more high pulmonary hypertension .(p=0.000) . These results were consistent with Raj et tal ⁽⁸⁾. There were no statistically significant correlation between mitral stenosis severity and other cardiac valves . There were statistically significant correlations between pulmonary hypertension and tricuspid regurgitation with or without mitral regurgitation.

Discussion

Table2. Demographic distribution of pulmonary hypertension with mitral stenosis among variables

Variables		Pulmonary artery systolic pressure (PASP)		P= value
		NORMAL	Pulmonary hypertension	
Sex	Male	10 (40%)	15 (60%)	0.134
	Female	13 (23.6%)	42 (76.4%)	
Age	20-29 years	0 (10.7%)	28 (100%)	0.36
	30-39 years	11 (34.4%)	21 (65.6%)	
	More than 40 years	12(60%)	8 (40%)	
Mitral valve area	Mild MS>1.5 cm	12 (66.7%)	6 (33.3%)	0.000
	Moderate MS1.5-1 cm	8 (23.5%)	26 (76.5%)	
	Severe MS<1 cm	3 (10.7%)	25 (89.3%)	
TR		17 (23.6%)	55 (76.4%)	0.002
MR		12 (42.9%)	16 (57.1%)	0.041
AR		8(28.8%)	57 (71.3%)	0.97

Conclusions

The predictors for mitral stenosis severity in this study that female, younger than 40 years old, echocardiographic evidence of pulmonary hypertension and tricuspid regurgitation with or without mitral regurgitation.

Recommendation

We recommended that follow up all patients with mitral valve stenosis by pulmonary artery systolic pressure measured by Doppler echocardiography .

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