

Research Article

**An assessment of mitral stenosis by using Two-dimensional (2D)
Doppler echocardiography**

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ABSTRACT

Objective: To assess the mitral stenosis by using Two-dimensional (2D) Doppler echocardiography

Material and Methods: This cross sectional study was conducted at Department of Cardiology, Bahawal Victoria Hospital, Bahawalpur from September 2017 to March 2018 over the period of 6 months. Total 250 cases of valve stenosis were selected and severity was assessed by using Two-dimensional (2D) Doppler echocardiography.

Results: Mean age of the patients was 37.8 ± 9.45 and duration of symptoms was 7.55 ± 5.67 months. Mild stenosis was found in 40 (16%) patients, moderate stenosis in 88 (35%) patients and severe stenosis was found in 122 (49%) patients. Significant association of age and gender with severity of stenosis was found.

Conclusion: Results of this study reveals that most of patients found with severe mitral valve stenosis.

Stenosis was common in younger age group as compare to older age group and severity of stenosis significantly associated with age of the patients. Females were more affected by mitral valve stenosis as compare to male patients and significant association between gender and severity of the stenosis was found.

Key words:

Mitral valve area, echocardiography, mitral Stenosis, mitral leaflet separation

INTRODUCTION

The most frequent valvular heart lesion is mitral stenosis (MS) and rheumatic fever is most common cause of MS.¹About 25% of all individuals with rheumatic heart disease have isolated mitral stenosis, and about 40% have combined mitral stenosis and mitral regurgitation. Multivalve involvement is seen in about 38% cases of MS with aortic valve affected in 35% and tricuspid valve in about 6% the pulmonary valve is rarely affected.²Rheumatic fever results in characteristic changes of mitral valve, diagnostic

features are thickening at the leaflet edges, fusion of commissures, chordal shortening and fusion³.

Determining the severity of MS is very important for therapeutic and prognostic reasons. Severity of MS can be assessed clinically as well as with different investigations. On clinical basis the severity is assessed by unctatas classified by NYHA classification, history of palpitation on exertion, haemoptysis and cough, poor growth, frequent respiratory tract infections, frequent admissions to hospital with pulmonary oedema, and previous thromboembolic phenomenon.⁴

For the assessment of MS, 2d echocardiography is gold standard.⁵The mitral valve area (MVA) can be measured by planimetry, pressure half-time, continuity equation, and proximal isovelocity surface area methods⁶. In a study by Shaikh AM, et al, the frequency of severity of mitral stenosis (diagnosed on 2 D echo planimetry MVA cm was described as: mild (30.3%), moderate (42.4%) and severe (27.3%).⁷

Direct measurement of MVA by planimetry is accurate but is highly operator dependent and sometimes laborious. The reliability of the pressure half-time method is affected by changes in preload or left ventricular compliance. The transmitral gradient is also well correlated with MS severity.⁸

The treatment of mitral stenosis depends upon the severity of disease. This will effect on therapeutic or prognostic values. This is essential to determine the frequency of severity, as majority of the patients present late in our country due to common quackery practice and ignorance of health in a developing countries like Pakistan. This will help us to planning and making its strategy to this particular treatment.

MATERIALS AND METHODS

This cross sectional study was conducted at Department of Cardiology, Bahawal Victoria Hospital, Bahawalpur from September 2017 to March 2018 over the period of 6 months. Total 250 cases of valve stenosis were selected and severity was assessed by using Two-dimensional (2D) Doppler echocardiography, both male and female, age between 20-50 years and patients with duration of symptoms of 1-12 months were selected for the study. This study was approved by review committee of the institution and an informed consent was obtained from every patient. Patients with any prior surgical or interventional procedures for treatment of heart disease, patients with suboptimal images and/or heavy mitral valvular calcification precluding the accurate measurement of cuspal separation. Patients with duration of symptoms less than one month and those with more than one year,

hemodynamically unstable patients and patients with systolic blood pressure <90mm of Hg was excluded from the study.

The Demographic data and detailed history was taken. Previous medical record was checked. The severity (mild, moderate, severe) of the mitral stenosis was labeled as per findings of 2 D echocardiography (gold standard). Severe mitral stenosis would be defined as MVA of 1cm² or less by planimetry or pressure half-time, Moderate mitral stenosis was defined as MVA between 1cm² and 1.5cm² by planimetry or pressure half-time method and Mild Mitral Stenosis was defined as an MVA of more than 1.5cm² by planimetry or pressure half-time. All information was entered on Performa.

Data was entered and analyzed using SPSS version 17.0. The quantitative variables were presented as mean and standard deviation. The qualitative variables were presented as frequencies. Effect modifiers was controlled through stratification of age, gender and duration of symptoms to see the effect of these on outcome variables i.e mild, moderate and severe. Post stratification chi square test was applied and p-value ≤ 0.05 was taken as significant.

RESULTS

In this study total 250 patients with mitral valve stenosis were included. Mean age of the patients was 37.8 ± 9.45 and duration of symptoms was 7.55 ± 5.67 months. Mild stenosis was found in 40 (16%) patients, moderate stenosis in 88 (35%) patients and severe stenosis was found in 122 (49%) patients. (Fig. 1)

Stratification of patients in relation to age was done and two groups were made age group 20-35 years and age group 36-50 years. Out of 135 (54%) patients of age group 20-35 years, mild moderate and sever stenosis was seen in 11 (11%), 39 (31%) and 80 (58%) patients respectively. Out of 115 (46%) patients of age group 36-50 years, mild, moderate and sever stenosis was seen in 24 (20.87%), 49 (42.61%) and 42 (36.52%) patients. Significant (P = 0.002) association of age with severity of stenosis was found. (Table 1)

Male patients were 89 (35.6%) and female patients were 161 (64.4%). Twenty-four (26.97%) male patients were found with mild stenosis followed by moderate stenosis 19 (21.35%) and severe stenosis in 46 (51.69%) male patients. In female patients, mild, moderate and severe stenosis was seen 16 (9.94%), 69 (42.86%) and 76 (47.2%) respectively. Gender of the patients was

significantly ($P = 0.001$) associated with severity of stenosis. (Table 2)

Total 142 (56.8%) were found with 1-6 months of duration of symptoms and 108 (43.2%) patients were found with 7-12 months of duration of symptoms. Insignificant ($P = 0.289$) association of duration of symptoms with severity of stenosis was found. (Table 3)

Fig. 1: Severity of mitral stenosis

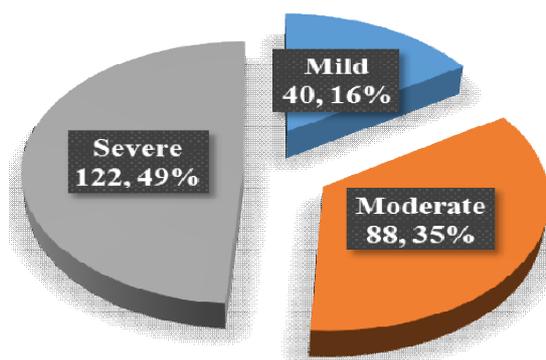


Table 1: Association of age with severity of stenosis

Age Group	Stenosis			Total	P. value
	Mild	Moderate	Severe		
20-35	16 (11%)	39 (31%)	80 (58%)	135 (54%)	0.002
36-50	24 (20.87%)	49 (42.61%)	42 (36.52%)	115 (46%)	
Total	40 (16%)	88 (35%)	122 (49%)	250	

Table 2: Association of gender with severity of stenosis

Gender	Stenosis			Total	P. value
	Mild	Moderate	Severe		
Male	24 (26.97%)	19 (21.35%)	46 (51.69%)	89 (35.6%)	0.001
Female	16 (9.94%)	69 (42.86%)	76 (47.2%)	161 (64.4%)	
Total	40 (16%)	88 (35%)	122 (49%)	250	

Table 3: Association of duration of symptoms with severity of stenosis

Duration for Symptoms	Stenosis			Total	P. value
	Mild	Moderate	Severe		
1-6 Months	27 (19.01%)	50 (35.21%)	65 (45.77%)	142 (56.8%)	0.289
7-12 Months	13 (12.04%)	38 (35.19%)	57 (52.78%)	108 (43.2%)	
Total	40 (16%)	88 (35%)	122 (49%)	250	

DISCUSSION

In decision making for MS, echocardiography plays a major role, allowing for the confirmation of diagnosis, quantitation of severity of stenosis, its consequences and analysis of valve anatomy.⁹

MS is the most frequent valvular complication of rheumatic fever. Even in industrialized countries, most cases remain of rheumatic origin as other causes are rare. Given the decrease in the prevalence of rheumatic heart diseases, MS has become the least frequent single left-sided valve disease. However, it still accounts for 10% of left-sided valve diseases in Europe. But mitral stenosis is the most common finding in echocardiography in developing countries as a consequence of rheumatic fever which is endemic here.¹⁰

In the present study 250 patients of mitral stenosis were studied and an attempt has been made for the clinical evaluation with non-invasive investigation like 2-D echocardiography in patients with mitral stenosis.

In present study, mild stenosis was found in 16% patients, moderate stenosis in 35% patients and severe stenosis was found in 49% patients. Sheikh et al⁹ reported mild stenosis in 30.3% patients, moderate stenosis in 42.4% patients and severe stenosis in 27.3% patients. In another study of Faheem et al¹⁰ mild stenosis was found in 37.6% patients and moderate stenosis was found in 37.9% patients and severe stenosis was present in 24.5% patients. In another study at Karachi by Zahedet al¹¹ showed that 27.1% patients had mild mitral stenosis, 47.1% moderate and severe in 25.1% patients. These findings are in contrast with our study.

Mitral stenosis is one of the most common acquired valvular heart disease in Pakistan. It affects all age groups. The definitive treatment is relief of obstruction by surgery or balloon valvuloplasty. The main important characters which determine the operability and the type of surgery are the severity of mitral stenosis and morphology of the stenosed valve.^{12,13}

In present study, 54% of the patients of mitral valve stenosis belonged to younger age group and 46% patients belonged to older age group. Similarly, Aurakzai et al¹⁴ reported moderate to severe stenosis in older age group. In our study, female patients were found more effected by mitral valve stenosis as compare to male patients (35.6% vs 64.4%). Similarly, Sheikh et al¹⁵ reported more (65.4%) female was affected by mitral stenosis as compare to male. In one study by Sleh et al,¹⁶ echocardiography scanning was performed in all selected patients. After scanning, mitral stenosis was found in 48.3% male patients and 52.1% female patients and severity of stenosis was 4.1% mild, 9.5% moderate and 18.8% severe stenosis.

CONCLUSION:

Results of this study reveals that most of patients found with severe mitral valve stenosis.

Stenosis was common in younger age group as compare to older age group and severity of stenosis significantly associated with age of the patients. Females were more affected by mitral valve stenosis as compare to male patients and significant association between gender and severity of the stenosis was found.

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