MEDICAL CHANNEL

Original Article

FREQUENCY OF MITRAL VALVE STENOSIS AMONG ADULT PATIENTS OF RHEUMATIC HEART DISEASE ADMITTED IN LUMHS AND MMC

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ABSTRACT

Objective: To assess the frequency of mitral stenosis and its severity in adult patients of rheumatic valvular heart disease.

Methodology: A cross sectional and retrospective study was conducted in medical department of LUMHS Hyderabad and MMC Mirpurkhas hospitals, from Sep 2005 to June 2011. 200 adult patients of rheumatic heart disease were randomly included in this study. Diagnostic criteria for acute rheumatic fever used were revised Jon's criteria. Record files of patients were collected and studied thoroughly. Special proforma were prepared. Diagnosis was confirmed by ECG, X-Ray chest, transthoracic two dimensional 2D echocardiography and Doppler studies. Severity of mitral stenosis was graded by 2D echocardiography, using planimetry and Doppler. By Doppler technique the severity of mitral stenosis was assessed by atrioventricular (AV) pressure half-time. By typical CW continuous wave spectral recording of mitral stenosis, mitral valve gradient; end- diastolic pressure gradient and mean pressure gradient were calculated using the modified Bernoulli equation to assess the severity of mitral stenosis.

Statistics: Statistical analysis was carried out by SPSS 16. Percentages mean values, standard deviation, variance in standard deviation and p value was calculated.

Results: Age of patients was from 12-70 years, mean age was 35.21 ± 19.75 years and median age was 31 years. Males in our study were 88 (44%) and females were 112 (56%). Male/Female ratio was 1/1.3. 124 (62%) patients were between 12–30 years and 76 (38%) patients were above 30 years. Mitral stenosis was seen in 66 (33%) patients. Next most common cardiac lesion in our study was mitral regurgitation 56 (28%). Mixed aortic valve disease was 24 (12%). Aortic stenosis was in 10 (5%) and 130 (65%) had various grades of pulmonary hypertension Table 1. Severity of mitral stenosis was assessed by different techniques. Frequency of severe MS has been shown in Table 2. Mean values are shown in Table 3.

Conclusion: It has been concluded in this study that in adult patients with rheumatic heart disease, the frequency of mitral stenosis was 66 (33%). Severe MS was 15(22.7%) by end- diastolic pressure gradient method and 18 (27.3%) by planimetry. Severity calculated by various techniques was similar.

Key words: Rheumatic heart disease, Frequency, Mitral stenosis

INTRODUCTION

Rheumatic fever is an inflammatory disease involving many connective tissues of the body, specially heart, joints, skin and brain. The incidence of Mitral stenosis (MS) has decreased in developed countries due to impressive alleviation of rheumatic fever. However, in our part of the world it is one of the major health problems and a great challenge for the health care professionals[1]. It has been found that acute rheumatic fever follows 0.3% patients of group A beta-hemolytic streptococcal pharyngitis. Around 39% of acute rheumatic fever patients develop various grades of carditis; endocarditis, myocarditis or pericarditis[2]. In Pakistan prevalence of Rheumatic heart disease is 5.7 per 1000[3]. Revised

Jones Criteria for Acute Rheumatic Fever are; Major Criteria: Carditis; Polyarthritis; Chorea; Erythema marginatum; Subcutaneous nodules. Minor Criteria: Fever, Arthralgia, Previous rheumatic fever or rheumatic heart disease; Acute phase reactants, Leukocytosis, elevated ESR, C-reactive protein and Prolonged P-R interval on electrocardiogram. Evidence of preceding streptococcal infection: Any one of the following is considered adequate evidence of infection: Increased antistreptolysin O or other streptococcal antibodies, Positive throat culture for Group A beta-hemolytic streptococci, Positive rapid direct Group A strep carbohydrate antigen test, Recent scarlet fever[4]. A firm diagnosis requires two major or one major and two minor criteria, in addition to evidence of recent streptococcal infection. A study has shown that rheumatic fever is on decline in our setup[5]. Rheumatic fever leads to deformed valves of the heart. There is progressive thickening, fibrosis and calcification of valves. In mitral stenosis left atrium enlarges and mural thrombi are formed in it resulting into thromboembolism. The stenotic valve has fish mouth appearance. It has been revealed that left atrial volume was more strongly associated with markers of thromboembolic risk than left atrial diameter, which poorly reflected left atrial size[6]. Severity of mitral stenosis can be assessed by various techniques it has been observed that Doppler echocardiography technique appears to determine mean and mid-diastolic mitral valve gradients with an accuracy that is sufficient for diagnostic purposes[7]. Observing a lot of cases of rheumatic valvular heart disease and their complications in our setup and periphery it was planned to assess the frequency of mitral stenosis in adult patients of rheumatic valvular heart disease in two tertiary care hqspitals LUMHS Jamshoro/ Hyderabad and MMC Mirpurkhas.

METHODOLOGY

A cross sectional and retrospective study was conducted in medical department of LUMHS Hyderabad and MMC Mirpurkhas hospitals, from Sep 2005 to June 2011. Total 200 adult patients of rheumatic heart disease were randomly included in this study. Diagnostic criteria for acute rheumatic fever used were revised Jon's criteria. Patients with congenital heart disease, coronary heart disease and cardiomyopathies were excluded from the study. Record files of patients were collected and studied thoroughly regarding history, clinical examination and investigations. Special proforma were prepared. Diagnosis was confirmed by electrocardiogram, X-Ray chest, transthoracic two dimensional 2D echocardiography and Doppler studies. Severity of mitral stenosis was graded by 2D echocardiography, using planimetry and Doppler. By Doppler technique the severity of mitral stenosis was assessed by atrioventricular (AV) pressure half-time. Mitral valve area was calculated by 220/pressure half time. By typical CW continuous wave spectral recording of mitral stenosis, mitral valve gradient; end- diastolic pressure gradient and mean pressure gradient were calculated using the modified Bernoulli equation to assess the severity of mitral stenosis. By 2D echo severity was graded as mild 1.5 to 2.5 cm^2, moderate 1 to 1.5 cm^2, and severe < 1 cm^2. By pressure half time severity was assessed as mild MS: 90 to 150 ms, moderate MS: 150 to 219 ms and severe MS: > 220 ms. End diastolic pressure gradient mild MS: 2 to 6mmHg, moderate MS: 6 to 10 mm Hg and severe MS: >10 mm Hg. Mean pressure gradient mild MS: < 5 mmHg moderate MS: 6 to 12 mm Hg and severe MS: > 12 mm Hg.

STATISTICS

Statistical analysis was carried out by SPSS 16. Mean values were calculated along with percentages, standard deviation ±SD, variance in standard deviation and p value. Significant p value was taken as < 0.01

RESULTS

Total 200 patients were enrolled in this study. Age of patients was from 12 years to 70 years, mean age was 35.21 ± 19.75 years and median age was 31 years. Males in our study were 88 (44%) and females were 112 (56%). Male/Female ratio was 1/1.3. 124 (62%) patients were between 12–30 years, mean age was 19 ± 5.74 years and median age was 18.5 years. 76 (38%) patients were above 30 years, mean age was 56.33 ± 11.26 ears and median was 58 years. 72% patients were from rural areas. Mitral stenosis was seen in 66 (33%) patients, 38 (57.6%) were females and 28 (42.4%) males. Next most common cardiac lesion in our study was mitral regurgitation found in 56 (28%) patients, males were

TABLE 1
FREQUENCY OF DIFFERENT VALVE LESIONS AMONG ADULT PATIENTS OF RHEUMATIC HEART DISEASE ADMITTED IN LUMHS AND MMCH
n 200

VALVE DISEASE	STUDY GROUP n100	MALE GROUP n44	FEMALE GROUP n56
MITRAL STENOSIS	66 (33%)	28 (42.4%)	38 (57.6%)
MIXED MITRAL STENOSIS AND MITRAL REGURGITATION	44 (22%)	20 (45.5%)	24 (54.5%)
MITRAL REGURGITATION	56 (28%)	36 (64.3%)	20 (35.7%)
AORTIC STENOSIS	10 (5%)	8 (80%)	02 (20%).
MIXED AORTIC STENOSIS AND AORTIC REGURGITATION	24 (12%)	16 (66.7%)	8 (33.3%)
TRICUSPID STENOSIS	0	0	0
PULMONARY HYPERTENSION	130 (65%)	78 (60%)	52 (40%)

TABLE 2
SEVERITY OF MITRAL STENOSIS BY 2D ECHO AND DOPPLER
n66

METHOD	MILD	MODERATE	SEVERE
2D ECHO PLANIMETRY MVA cm^2	20 (30.3%)	28(42.4%)	18 (27.3%)
PRESSURE HALF TIME seconds	22(33.3%)	27(40.9%)	17(25.8%)
END DIASTOLIC PRESSURE GRADIENT mmHg	23(34.8%)	28(42.4%)	15(22.7%)
MEAN PRESSURE GRADIENT mmHg	22(33.3%)	26(39.4%)	18 (27.3%)

2D echo, mild 1.5 to 2.5 cm^2, moderate 1 to 1.5 cm^2, and severe < 1 cm^2
Pressure half time, mild: 90 to 150 ms, moderate: 150 to 219 ms and severe: > 220 ms
End diastolic pressure gradient, mild: 2 to 6mmHg, moderate: 6 to 10 mm Hg, severe: >10 mm Hg
Mean pressure gradient, mild: < 5 mmHg, moderate: 6 to 12 mm Hg, severe: > 12 mm Hg.

TABLE 3
MEAN VALUES BY VARIOUS METHODS IN SEVERE MITRAL STENOSIS

METHODS	FREQUENCY OF SEVERE MS n66	Mean (Average) VALUES	Standard deviation ±	Variance (Standard deviation)
2D ECHO PLANIMETRY MVA cm^2	18 (27.3%)	0.83 cm^2	±0.11	0.012
PRESSURE HALF TIME seconds	17(25.8%)	268.58 ms 0.82 cm^2	±32.34 ±0.01	1046.36
END DIASTOLIC PRESSURE GRADIENT mmHg	15(22.7%)	13.6 mm Hg	±1.6	2.6
MEAN PRESSURE GRADIENT mmHg	18 (27.3%)	14.72	±1.52	2.33

36 (64.3%) and females 20 (35.7%). Mixed lesion of mitral valve disease was 44 (22%), females 24 (54.5%) and males 20 (45.5%). Mixed aortic valve disease was 24 (12%), males 16 (66.7%) and females 8 (33.3%). Aortic stenosis was in 10 (5%) patients, males 8 (80%) and females 02 (20%). Out of total patients 130 (65%) had various grades of pulmonary hypertension, males 78 (60%) and females 52 (40%) Table 1. Severity of mitral stenosis was assessed by different techniques and categorized as Mild MS, Moderate MS and severe MS. Frequency of severe MS was found to be 15 (22.7%) by end- diastolic pressure gradient method and 18 (27.3%) by planimetry method. Table 2. Mean values by different techniques are shown in Table 3. Mitral valve area in severe MS calculated by transthoracic 2D planimetry was 0.83±0.11 cm^2, also similar to calculated by pressure half time Doppler technique 268.58±32.34 ms (0.82±0.01 cm^2) p value 0.0001.

DISCUSSION

Rheumatic heart disease is a common cardiovascular disease in our country. Rheumatic mitral stenosis with atrial fibrillation is a common clinical problem in Pakistan[8]. It is a potential source of thrombus formation and associated with a very high risk of embolic cerebro-vascular accidents, which is reported to be as much as seventeen times greater than in unaffected controls[9]. In our study most common rheumatic valvular lesion was predominant mitral stenosis which was observed in 66 (33%) patients, 38 (57.6%) were females and 28 (42.4%) males. Mitral stenosis was more common in adult females rather than males; female to male ratio is 1.3/1. Next most common cardiac lesion in our study was mitral regurgitation 56 (28%). Mixed mitral valve disease was (22%). Frequency of severe MS was found to be 15 (22.7%) by end- diastolic pressure gradient method and 18 (27.3%) by planimetry method Table 2. In our study around 11(16%) patients of mitral stenosis had associated atrial fibrillation. The study shows that pure mitral stenosis was seen in 30 patients (30%), 22 (73.33%) were females and 8 (26.66%) were males[10], which is comparable to our study. A study has found that frequency of mitral valve disease is 68% and aortic valve disease is 25% in rheumatic valvular heart disease[11]. And the frequency of atrial fibrillation with mitral stenosis was calculated as 25.9%[12]; which is much higher than our study. A study carried out in children with mean age of 9.3 years did not showed any case of mitral stenosis which shows that this lesion takes time to develop[13]. It has been seen that frequency of mitral stenosis was 48% in a study. Another study conducted at Peshawer revealed that mitral stenosis was the predominant valvular lesion 70% patients; of those 24.5% patients had severe mitral stenosis [14]. A study conducted at Karachi showed that 19(27.1%) patients had mild mitral stenosis, 33(47.1%) moderate and severe in 18(25.1%) patients[15].

Our study showed that severity of mitral stenosis varies slightly with various techniques as shown in Table 2 and 3. Mild MS was 20 (30.3%) by planimetry and 23(34.8% by end diastolic pressure gradient method, moderate MS 26(39.4%) by mean diastolic pressure gradient method and 28(42.4%) by planimetry method and severe MS 15(22.7%) by mean diastolic pressure gradient method and 18 (27.3%) b planimetry method. Table 3 reveals that frequency of severe mitral stenosis is same 18 (27.3%) by transthoracic 2D planimetry technique or by mean pressure gradient, calculated by

Doppler technique. Mitral valve area in severe MS calculated by transthoracic 2D planimetry was 0.83±0.11 cm^2, also similar to calculated by pressure half time Doppler technique 268.58±32.34 ms (0.82±0.01 cm^2) p value 0.0001. It has been found that real-time, 3-dimensional echocardiography can provide not only the anatomic structure of mitral valve apparatus, but also the optimal plane of the smallest mitral valve orifice, and can thus accurately measure the mitral valve area[16]. It has been studied that planimetry of the mitral valve area with multidetector computed tomography did not differ from that with transthoracic two-dimensional echocardiography (1.88 +/- 0.46 cm2 versus 1.83 +/- 0.50 cm2, p = 0.242), and there was an excellent correlation between two techniques (r = 0.923, p < 0.0001)[17].

CONCLUSION

It has been concluded in this study that in adult patients with rheumatic heart disease, the mitral stenosis is most common lesion, the frequency of mitral stenosis was 66 (33%), severe MS 15(22.7%) by mean diastolic pressure gradient method and 18 (27.3%) b planimetry method and severity of mitral stenosis was similar measured by various techniques.

REFERENCES

1. Ullah K, Ahmed SA, Badsha S, Khan A, Kiani MR. Rheumatic Heart disease - A study of surgically excised cardiac valves and biopsies. J Coll Physicians Surg Pak 2002; 12: 542-5.
2. Ralph A, Jacups S, Mcgough K, Mcdonald M, Curie B. The challenge of aute rheumatic fever diagnosis in a high incidence population: a prospective study and proposed guidelines in Austrelia's northern territory. Heart Lung Circ, 2006; 15: 113-18.
3. Rizvi S, Khan M, Kundi A, Marsh D, Samad A. Status of rheumatic heart disease in rural Pakistan. Heart 2004; 90: 394-9.
4. Guidelines for the diagnosis of rheumatic fever. Jones Criteria, 1992 update. Special Writing Group of the Committee on Rheumatic Fever: Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young of the American Heart Association. JAMA. 1992;268;15.
5. Amin J, Rahim F, Asghar H, Shafique M, Hameed A, Nadeem K. Changing clinical pattern of Rheumatic Fever at Peshawar, (Pakistan). J Postgrad Med Inst 2004;18:250-4.
6. Niall G, Caroline G, Claire C, Eric B, Laurent l, Delphine D. Usefulness of Left Atrial Volume Versus Diameter to Assess Thromboembolic Risk in Mitral Stenosis. American Journal of Cardiology 2010; 106: 1152-1156.
7. Jarle H, Svein S. Determination of pressure gradient in mitral stenosis with Doppler echocardiography. British Heart Journal 1979. 41: 529-535.
8. Khan RF, Imtiaz Y, Ali H, Khan MU, Ali M, Riaz N, et al. Natural History and Relative Distribution of Different Valvular Heart Diseases in Mayo Hospital, Lahore. Ann King Edward Med Coll 2002; 8: 90-1.
9. Greenblatt DJ, Sellers EM, Shader RI. Drug therapy: drug disposition in old age. N Engl J Med 1982; 306: 1081-8.
10. Imran A, Hashim S R, Usman M. Rheumatic heart disease. Professional Med J, 2003;10:212-6. 7 Hamzullah K. Rheumatic heart disease. Professional medical journal. 2009; 16:100-4.
11. Razzaq A, Niaz Z, Aziz B, Saleem A, Nazar T, Ali A et al. Frequency of atrial fibrillation in Mitral Stenosis and its correlation with left atrial size. Ann King Edward Med Uni 2005;11:268-70.
12. Jadoon S, Haider N, Hassan M. Retrospective analysis of 54 patients with Acute Rheumatic Fever. Pak Paed J 2003;27:118-20.
13. Shaikh M A, Ghori R A,Deve ranjani B R. Sequelae of chronic rheumatic heart disease among patients at two teaching hospitals in Sindh Pakistan. JLUMHS 2006;5: 114-8.
14. Faheem M, Hafizullah M, Gul A, Hikmatullah J, Asghar M. Pattern of valvular lesions in rheumatic heart disease. J Postgrad Med Inst 2007;21: 99-103.
15. Zahed S, Izhar A, Samad A. Echocardiographic profile of patients with Mitral stenosis. Pak J Cardiol 2007;18: 18-24.
16. Ming X, Zin F, Tsung O, Jung W, Qing L. Comparison of Accuracy of Mitral Valve Area in Mitral Stenosis by Real-Time, Three-Dimensional Echocardiography Versus Two-Dimensional Echocardiography Versus Doppler Pressure Half-Time. American Journal of Cardiology 2005; 95: 1496-1499.
17. Uçar O, Vural M, Cetfïn Z, Gökaslan S, Gürsoy T, Paþaoðlu L, Assessment of planimetric mitral valve area using 16-row multidetector computed tomography in patients with rheumatic mitral stenosis. J Heart Valve Dis. 2011;20:13-7.