

Original Research Article

A study to assess valvular heart disease in a tertiary care hospital: a single centre finding

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ABSTRACT

Background: Diseases of the heart valves constitute a major cause of cardiovascular morbidity and mortality worldwide with an enormous burden on healthcare resources. The present study was undertaken to study incidence and demography of valvular heart disease, to assess echocardiography and colour doppler findings of patients with valvular heart disease and to find out complications in patients with valvular heart disease.

Methods: A hospital based longitudinal case study was undertaken at medicine department of Dr. V.M. Government Medical College, Solapur, Maharashtra, India for a period of two years. One hundred and twenty-four (124) patients attending OPD participated in the study.

Results: In the present study, out of 124 patients, mitral valve was most commonly involved, 105(84.67%) and the least common involved was tricuspid 1(0.81%). The most common aetiology was rheumatic origin 75(94.94%). In the present study the most common complication was pulmonary hypertension 69(55.65%), followed by congestive cardiac failure (33.87%), acute pulmonary edema (12.09%), infective endocarditis (4.84%), cerebrovascular accident (4.03%), left atrial thrombus (3.23%) and death (3.23%).

Conclusions: Multiple valves were affected in more than a third of all cases, although recent research in India continue to demonstrate a declining trend in the prevalence of RHD, rheumatic involvement is still the dominant form of valvular heart disease in India.

Keywords: Echo-cardiograph, Mitral stenosis, Pulmonary hypertension, Valvular heart disease

INTRODUCTION

Diseases of the heart valves constitute a major cause of cardiovascular morbidity and mortality worldwide with an enormous burden on healthcare resources. Rheumatic heart disease is the commonest cause of cardiac morbidity and mortality in India. Among the valvular heart disease, rheumatic mitral valvular disease is the

most commonly encountered, aortic valvular disease ranks, second in the incidence, tricuspid valve disease occurs occasionally and pulmonary valve disease rarely.¹ Epidemiological study show a prevalence rate of upto 5.1/1000 in the rural population and 1.6/1000 in urban Population. The calcific aortic stenosis was first documented in 1904 and was thought to be an uncommon lesion.² Most of the observations were obtained from

autopsy studies. Till 19th century it was not recognized as a separate clinical entity.³ As a result the aortic valve sclerosis (i.e. cusp thickening without stenosis) and calcific aortic valve stenosis were regarded as different pathological conditions for many decades. Recent evidence however suggests that they represent different stages of the same disease process.⁴ Sclerosis arises from thickening and fibrosis of the aortic valve leaflets. It progresses slowly over several decades ultimately leading to aortic stenosis.^{5,6} Lesions of the aortic valve like aortic stenosis and aortic regurgitation are seen in multiple conditions including rheumatic, degenerative, connective tissue diseases and infective endocarditis. Predominant cause of aortic stenosis in western countries is degenerative calcific disease in middle aged and elderly patients, though in tropical countries rheumatic aortic stenosis is still common. Aortic regurgitation also arises frequently from a degenerative process apart from rheumatic and congenital lesions.⁷ With RHD affecting predominantly the young population in their productive years, the socio-economic impact on the society is enormous.

The echocardiography and color doppler study is the most sensitive specific and non-invasive tool and is considered to be a gold standard investigation in the evaluation of the valve lesions. The M-mode describes valve morphology, leaflet thickness, mobility and calcification. Scarcity of data exists on the extensiveness of valvular heart disease as studied by echocardiography (Echo).

The present study was undertaken with the aim of systematically analyzing the data on valvular heart disease, so this study was conducted to quantify the clinical spectrum of valvular heart diseases to achieve the following objectives. The aim and objectives of this study was to study of incidence and demography of valvular heart disease, to study echocardiography and color doppler findings of patients with valvular heart disease, to study the complication in patients with valvular heart disease.

METHODS

A hospital based longitudinal case study was undertaken at medicine department of Dr. V.M. Government Medical College, Solapur, a tertiary care health center located at Maharashtra, central India. Study was carried out from the 2009 to 2011, for a period of two years. One hundred and twenty-four (124) patients attending OPD participated in the study. Convenient sampling method was adopted for selection of study participants. Approval was taken from the institutional ethics committee. All patients with organic valvular heart disease were included in the study. All patients with functional valvular heart disease and trivial or insignificant regurgitation were also excluded to avoid erroneous estimates that can be produced by these large numbers of insignificant lesions.

Data collection and procedure

A structured self-administrative questionnaire was developed with the aid of available evidences by the researchers for data collection to fully meet the demands of this research. The purpose of the study was explained to the participants and written, and verbal consent was obtained.

The developed questionnaire is corrected, revised and validated by clinicians. It was pretested before its use in this study. This tool contained questionnaire includes the following component-age of patients, sex, valve involved, cause, type of valve lesions, clinical features, complications, clinical history, chest x-ray, ECG findings, 2D echocardiography. After taking consents both oral and written, Patients were examined carefully for cardiac valvular lesions and for signs. Patients underwent different investigations such as blood complete picture, ESR, ASO titre and other important routine count. M mode and 2D echocardiography and Doppler techniques were used. Views taken were parasternal long axis and short axis, apical four chamber view and sub costal four chamber views.

All four valves were studied in detail and valve area was measured in all the cases. All types of severe valvular lesions after excluding contraindications were advised surgical intervention. Follow up clinical examinations were performed every three months thereafter to record the onset of symptoms, complications and outcomes. Mean follow up was 14.77 (11.93) months.

Statistical analysis

Each completed questionnaire was coded on pre-arranged coding by the principal investigator to minimize errors. Data was checked for completeness and correctness. Data was analyzed using excel, windows 2007 and using SPSS V22. Descriptive statistics were applied.

RESULTS

The results were analyzed in appropriate parameters and in various combinations. The data is presented in tables and charts. Data is expressed in numbers, percentages and ratios. In this study, Out of total 124 patients, 72 (58.06%) were males and 52 (41.94%) were females, most patients were in the age group of 10-20 years 34 (25.80%), next in the age group of 30-40 years 26 (20.96%) and minimum were in the age group 70-80 years 5 (4.02%). In present study mitral valve was most commonly involved, 105 (84.67%) and the least common involved was tricuspid 1(0.81%) (Table 1).

The most common aetiology was rheumatic origin 75(94.94%) and least common was congenital 4(3.23%). In RHD, the order of involvement of valves was mitral 96(100%), followed by aortic 37(38.55%), and tricuspid 1(1.04%). In terms of etiology of various cardiac valve

lesions, rheumatic origin is the most common cause of mitral stenosis 75 (94.94%), predominantly seen in males. The predominant form of isolated MR 53

(92.98%), isolated AS 16 (55.17%) and AR 35 (77.78%) was rheumatic (Table 2).

Table1: Gender and valve wise distribution of cases.

| Valves involvements | Rheumatic | | Degenerative | | Mitral valve prolapses | | Congenital | | Total |
|---------------------|-----------|----|--------------|---|------------------------|---|------------|---|--------------|
| | M | F | M | F | M | F | M | F | |
| Mitral | 54 | 42 | 3 | 2 | 2 | 0 | | | 105 (84.67%) |
| Aortic | 25 | 12 | 9 | 5 | | | | | 51 (41.13%) |
| Pulmonary | | | | | | | 1 | 3 | 4 (3.23%) |
| Tricuspid | 1 | | | | | | | | 1(0.81%) |

Table 2: Etiology of various lesions and grading.

| Type of lesion | Rheumatic | Degenerative | Mitral valve prolapses | Congenital |
|--|-------------|--------------|------------------------|------------|
| Mitral stenosis (Mild MS: 17 (21.51%), Moderate MS: 24 (30.38%), Severe MS: 38 (48.1%)) | 75(94.94%) | 4 | 0 | 0 |
| Mitral Regurgitation (Mild MR: 20 (35.09%), Moderate MR: 18 (31.58%), Severe MS: 19 (33.34%)) | 53 (92.98%) | 2 | 2 | 0 |
| Aortic stenosis (Mild AS: 10 (34.48%), Moderate AS: 9 (31.03%), Severe AS: 10 (34.48%)) | 16 (55.17%) | 13 | 0 | 0 |
| Aortic regurgitation (Mild AR: 11(24.45%), Moderate AR: 22 (48.89%), Severe AR: 12 (26.66%)) | 35 (77.78%) | 10 | 0 | 0 |

Table 3: Type of isolated valve lesion.

| Type of valvular lesion | No. of patients | Percentage |
|-------------------------|-----------------|------------|
| MS | 29 | 23.8 |
| MR | 23 | 18.55 |
| MS+MR | 13 | 10.48 |
| MS+AR | 10 | 8.06 |
| AS+AR | 9 | 7.26 |
| MS+MR+AS+AR | 8 | 6.45 |
| MS+MR+AR | 8 | 6.45 |
| AS | 5 | 4.03 |
| AS+AR+MR | 3 | 2.42 |
| MR+AR | 2 | 1.61 |
| MS+AS+AR | 2 | 1.61 |
| MS+MR+AS | 2 | 1.61 |
| MS+AS | 2 | 1.61 |
| MVP | 2 | 1.61 |
| AR | 1 | 0.8 |
| MR+TS+TR+AR | 1 | 0.8 |
| PS | 4 | 3.23 |

In this study, the most common symptom was breathlessness (65.32%), followed by palpitation in 52.41 % of cases (Table 4). Atrial fibrillation represents most common ECG-finding. The frequently encountered complications in this study are pulmonary hypertension followed by CCF and pulmonary edema.

In the present study out of 124 patients, mitral valve was the most common valve involved 67 (54.03%), next mitral and aortic valve combined were involved in 36 (29.03%) and least involved were mitral aortic and tricuspid combined in 1 (0.81%).

Multiple valves were involved in nearly half of all cases (47.05%). The order of involvement was MS+MR>MS+AR>AS+AR>MS+MR+AS+AR>MS+M

R+AR>AS+AR+MR>MR+AR>MR+TS+TR+AR (Table 3).

Table 4: Commonly observed clinical features, ECG findings and complications.

| Clinical Features | | | ECG findings | | | Complications | | |
|--------------------|-----|-------|-----------------------|-----|-------|----------------------------|-----|-------|
| Finding | No. | % | Finding | No. | % | Finding | No. | % |
| Breathlessness | 81 | 65.32 | Atrial fibrillation | 35 | 28.22 | Pulmonary hypertension | 69 | 55.65 |
| Palpitation | 52 | 41 | Ventricular ectopics, | 3 | 2.42 | Congestive cardiac failure | 42 | 33.87 |
| Swelling of joints | 2 | 2.77 | | | | Pulmonary edema | 15 | 12.09 |
| | | | | | | Infective endocarditis | 6 | 4.84 |
| | | | | | | Cerebro vascular accident | 4 | 4.03 |
| | | | | | | Left atrial thrombus | 4 | 3.23 |

DISCUSSION

Echo is now the single most important modality of investigation in the diagnosis, management and follows up of patients with valvular heart disease. The superiority of echo over clinical examination in identifying subclinical rheumatic heart disease has been conclusively shown in various school surveys done across India.^{8,9} In the present study there were 124 patients, 72 were males and 52 were females, the ratio being 1.38:1. In a study by Aurakzai HA et al, the male: Female ratio was 1.17:1.¹⁰ In the present study out of the 100 patients with rheumatic heart disease 70 (70%) were in the age group of 10-40 years. In a study by Ramakrishna CD et al, in South India 33.50% of patients were younger than 40 years.¹¹ In a study by Meenakshisundaram R et al, in Chennai the mean age of males is 23 years and that of Females is 34 years.¹² In a study by Aurakzai HA et al in Pakistan.¹⁰ The mean age of males was 42.3 years and mean age of Females was 44.3 years.¹⁰ In the present study out of the 18 patients with degenerative valve disease all were more than 50 years of age. Rheumatic heart disease contributed the most to the burden of valvular heart disease (80.65%) in the present study. RHD continues to affect millions of children and young adults in the Indian subcontinent with prevalence rates varying from 4.54 to 6 per 1000 with estimates as high as 51 per 1000 in some studies, although some recent large series of school surveys have shown a decline in the prevalence of RHD (0.5-0.68 per 1000).¹³⁻¹⁷ In present study, the most common etiology of mitral stenosis was rheumatic 75 (94.94%), the most common etiology of mitral regurgitation was rheumatic 53 (92.98%), the most common etiology of aortic stenosis was rheumatic 16 (55.17%), the most common etiology of aortic regurgitation was rheumatic 35 (77.78%). This reflects the pathological involvement of the cardiac valves in acute rheumatic fever with mitral being the most common and pulmonary, the least.¹⁶ Our results are in contrast to another echocardiographic study of valvular heart disease, the Euro heart survey, a multicenter study

involving 5001 patients from 92 centers in 25 European countries.¹⁸ The most common etiology of mitral regurgitation was degenerative i.e. 61.3%. The most common lesions were AS (81.9%) and MR (61.3%), mostly of degenerative etiology. This difference conforms to the differing prevalence of valve disease among the developed and the developing nations. In a study by Manuel Martiner-Sells et al, the most common etiology of mitral regurgitation was rheumatic in 26%.¹⁹ The order of involvement of valve lesions in RHD in the current study was mitral, aortic, and tricuspid. Mitral stenosis was almost exclusively of rheumatic etiology (94.94%) in the current study. Surgical pathologic series show rheumatic involvement in almost 99% of excised stenotic valves similar to the results of the large necropsy series of Roberts WC (100%).¹⁹⁻²¹ Melvin found that MR+AR was the most common combination of rheumatic valvular lesions.²² In a study by Essien I O et al, in Nigeria isolated mitral valve involvement was seen in 65.45% isolated aortic valve involvement in 1.8% and mitral and aortic valve involvement in 33.3% of patients so it matches with present study.²³ In a study by J.N. Berry in northern India Mitral valve was involved in 84% of men, aortic valve was involved in 50% of men, so it matches with present study.²⁴ In a study by Bharani A et al, in Indore mitral valve was involved in 60.8%, mitral and aortic in (17.1%) aortic (2.1.1) and mitral, aortic and tricuspid in 6.7%.²⁵ In a study by Aurakzai HA et al, in Pakistan isolated mitral valve was involved in 27.59%, mitral and aortic in 23.13%.¹⁰ In a study by Marijan E et al, in Cambodia, mitral valve was involved in 87.3% of patients.²⁶ In a study by Aurakrai HA et al, 4.9% of males and 4.9% female had mild mitral stenosis, 0.1% of male and females had moderate mitral stenosis and 15.5 % of males and 15.1% of females had severe mitral stenosis. 30.7% of males and 26.5% of females had mild mitral regurgitation, 17.7% of males and 19.1% of females had moderate mitral regurgitation and 8.2% of males and 9.5% of females had severe mitral regurgitation. 0.5% of males and 0.9% of females had mild aortic stenosis, 0.1% of males and 3% of females had moderate aortic stenosis,

1% of males and 3% of females had severe aortic stenosis. 6.8% of males and 15% of females have mild aortic regurgitation, 18.9% of males and 34.3% of females have moderate aortic regurgitation and 3.6% of males and 6.2% of females have severe aortic.¹⁰ Bicuspid aortic valve was well represented in the present study. 29 had pure AS, 45 cases had pure AR and the rest had combined AS and AR (12.8%). This is comparable to the natural history autopsy series of 85 cases by Roberts WC et al.²⁷ 72% of bicuspid valves had developed stenosis while 13% had pure AR in that study. In the present study out of 124 patient's atrial fibrillation was present in 35 (28.22 %). In a study by Ramakrishna CD et al, in South India 32% of patients had atrial fibrillation.¹¹ In a study by Chockalingam et al, in Chennai, India 5.9 % of patients had atrial fibrillation.²⁹ In present study the most common symptom was breathlessness 81 (65.32%) of patients, followed by palpitation in 52.41 % of cases. A study by Shely MR et al, found breathlessness as the commonest symptom in 76% of cases and palpitation in 68.6 % cases.²⁸ In the present study the most common complication were pulmonary hypertension 69 (55.65%), followed by congestive cardiac failure (33.87%), acute pulmonary edema (12.09%), infective endocarditis (4.84%), Cerebrovascular accident (4.03%), left atrial thrombus (3.23%) and death (3.23%). In a study by Meenakshisundaram R et al, in Chennai, India Various complication noticed were congestive heart failure (54%), acute pulmonary edema (31%), embolic episodes (21%) and infective endocarditic (0.3%).¹² In a study by Chockalingam A et al, (2003) in Chennai pulmonary hypertension was present in 42.4% in patients aged 18 years and 80.8% in patients aged 17 years, 0.9% had left atrial thrombus, 0.4% had embolic cerebrovascular accidents.²⁹ In this study while assessing outcome, Out of the 120 survivors 78 (65%) patients remained unchanged, 42 (35%) patients progressed and 4 (3.23%) died. The development of one or more of the following features during the period of the observation was taken as evidence of progression Olesen KH et al.²⁹ The manifestation of chronic AF or right heart failure or thromboembolic complication or an increasing heart size or an impairment of functional capacity. Observation in the cause of mortality revealed that 50% died of congestive heart failure or pulmonary edema, 50% from thromboembolic complications. 3 patients had severe mitral stenosis and 1 patient had severe aortic stenosis. Both the patients who died of thromboembolic complications had severe mitral stenosis and chronic atrial fibrillation. Limitation of this study was based on the only small sample of patients and short duration of follow up was taken into account, because of resources and work force constraints, although strict morphologic and clinical criteria were used to ascribe etiology to a particular valve lesion, an Echo based study has inherent limitations in comparison to surgical or autopsy based studies, few important factors associated with health like nutrition, compliance, life style modification etc were not included in the study.

CONCLUSION

RHD contributed most to the burden of VHD in the present study. Multiple valves were affected in more than a third of all cases, although recent research in India continue to demonstrate a declining trend in the prevalence of RHD, rheumatic involvement is still the dominant form of valvular heart disease in India. The patterns described correlate well with the surgical and autopsy series described over several decades. With the advances in techniques and increasing experience of the operators, echo has nearly obviated the need for invasive cardiac catheterization for the anatomic and hemodynamic assessment of valve lesions. Echocardiography is now the single most important modality of evaluation for the management of patients with valvular heart disease.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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