

Original Research Article


Spectrum of rheumatic heart disease with complications and outcome after surgery

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Abstract

Background: RHD is a chronic heart condition caused by rheumatic fever. RHD is a disease affecting predominantly those living in poverty with inadequate access to health care and unchecked exposure to group A streptococcus.

Aim: This study was carried out in our tertiary level hospital to study the magnitude of RHD in the overall cardiac outpatients and inpatients and the spectrum of cardiac involvement with complications and outcome after surgery.

Material and methods: Present study was hospital based cross-sectional study over a period of 22 months at Department of Cardiothoracic Surgery including 39 patients with clinical and echocardiographic evidence of definite rheumatic heart disease and underwent valve repair. Information obtained included age, gender, names of referring hospital/physician, clinical diagnosis and echocardiographic findings.

Results: 20 -30 years of age group was most affected age group following 31-40 years most of the people were between 20-40 years. Male to female ratio was around 1:1.7 showing female predominance. Most of the patients in study were with shortness of breath. Mitral stenosis was the commonest echocardiographic diagnosis present in 22(56.41%) following Mitral regurgitation was 9(23.07%) of the patients, 25(64.1%) patients had secondary pulmonary hypertension. After surgical procedure for RHD-related disease, deaths reported by RHD-related valve repair 2 (5%).

Conclusion: Valve replacement is usually necessary, and they have good outcomes even if they are operated with severe regurgitation or stenosis.

Key words

Rheumatic heart disease, Echocardiography, Regurgitation, Stenosis.

Introduction

RHD is a chronic heart condition caused by rheumatic fever. RHD is a disease affecting predominantly those living in poverty with inadequate access to health care and unchecked exposure to group A streptococcus. A report outlined the increased risk of RHD in association with overcrowding and unemployment as well as overcrowding and distance from the nearest health center [1]. The importance of socioeconomic factors is further underscored by the virtual disappearance of RHD in industrialized countries since the mid-20th century, which started well before the introduction of penicillin. By contrast, RHD is still endemic in Africa, Asia, South America, and Australasia.

In India, population-based study indicates prevalence of RHD to be about 2/1000 population, however survey conducted in school children in the age group of 5-16 years by ICMR gives overall prevalence of 6/1000 (range 1.8 to 11/1000) [2]. So developing countries are still having fulminate course of rheumatic heart disease because the predisposing factors to rheumatic fever and inadequate prophylactic penicillin therapy. This is the reverse in the Western countries especially the United states of America where the disease is almost extinct. The situation in some countries (developing) is also compounded by lack of well-equipped medical set up to manage such condition. In India descriptions of rheumatic heart disease are from the southern part of the country and few literatures showed clinical and radiological diagnosis.

This study was carried out in our tertiary level hospital to study the magnitude of RHD in the overall cardiac outpatients and inpatients and the spectrum of cardiac involvement with complications and outcome after surgery.

Materials and methods

This was a hospital based cross-sectional study during June 2013 to April 2015 over a period of 22 months at Department of Cardiothoracic Surgery including 39 patients with clinical and echocardiographic evidence of definite rheumatic heart disease and underwent valve repair. Information obtained included age, gender, names of referring hospital/ physician, clinical diagnosis and echocardiographic findings.

Inclusion criteria

Consecutive 39 patients with echocardiographic evidence of definite rheumatic heart disease were included in the present study. 2012 World Heart Federation criteria for the echocardiographic diagnosis of rheumatic heart disease were applied to reach the diagnosis [3].

Exclusion criteria

Those not fitting into the echocardiographic criteria for diagnosis of definite RHD were excluded from the study.

Definition of RHD:

- A. Pathological MR and at least 2 morphological features of RHD of the MV
- B. MS mean gradient ≥ 4 mm Hg
- C. Pathological AR and at least 2 morphological features of RHD of the AV
- D. Borderline disease of both the AV and the MV

Borderline RHD (A, B, or C): At least 2 morphological features of RHD of the MV without pathological MR or MS, Pathological MR and Pathological AR.

Criteria for pathological regurgitation: (All 4 Doppler echocardiographic criteria must be met). Seen in 2 views: In at least 1 view, jet length ≥ 2 cm, velocity ≥ 3 m/s for 1 complete envelope, pan-systolic jet in at least 1 envelope.

Morphological Features of RHD

Features in Valve: Valve leaflet thickening ≥ 3 mm (age-specific), chordal thickening, restricted leaflet motion, excessive leaflet tip motion during systole.

Verbal consent was taken from each patient during the study period.

A heart murmur was found during a work-related medical examination, coincidental identification by the general practitioner, or coincidental identification during a work-up for other general surgery. Severe regurgitation or stenosis was measured and quantified according to the existing valvular guidelines. The study protocol was approved by the institutional review board of Hospital.

Perioperative details and follow-up were reported in accordance with the 2008 guidelines for reporting morbidity and mortality after cardiac-valve interventions [4]. Operative events were defined as those occurring within 30 days after surgery or any event later during the same post-operative hospital stay.

Intraoperative transoesophageal echocardiography was carried out routinely before and after repair. The majority of patients (>90%) were operated on by the same surgeon. The standard techniques of mitral valve replacement were carried out. All patients received anticoagulants in form of Acitrom or in some cases warfarin during post-surgery, if in sinus rhythm. Patients were followed with regular visits to the outpatient clinic.

Statistical analysis was performed using the SPSS (v17.0) software program. Quantitative variables are analyzed in terms of means and standard deviations. Qualitative variables are analyzed in terms of percentages and frequencies.

Results

20 -30 years of age group was most affected age group following 31-40 years most of the people were between 20-40 years. Male to female ratio was around 1:1.7 showing female predominance (**Table – 1**).

Table - 1: Demographic details in study group.

Age intervals in years	No. of cases	%
>20	6	15.38461538
20-30	11	28.20512821
31-40	10	30.76923077
41-50	4	12.82051282
51-60	5	12.82051282
>60	3	7.692307692
Total	39	100
Gender		
Males	14	38.46153846
Females	25	69.23076923

Most of the patients in study were with shortness of breath (**Table – 2**).

Table - 2: Clinical manifestations in patients.

Clinical findings	No. of cases	%
shortness of breath	25	64.1025641
chest pain	3	7.692307692
Palpitations	6	15.38461538
Cough	5	12.82051282
joint pains	1	2.564102564
Haemoptysis	1	2.564102564
Pedal odema	3	7.692307692
Loss of weight or appetite	1	2.5

Mitral stenosis was the commonest echocardiographic diagnosis present in 22(56.41%) following Mitral regurgitation was 9(23.07%) of the patients, followed by mixed mitral valve disease in 4(10.25%) as per **Table – 3** and **Figure - 1**.

25(64.1%) patients already had secondary pulmonary hypertension. The second and third commonest complications observed were

functional tricuspid regurgitation and Thrombus seen in 12 (30.7%) and 7(17.9%) patients, respectively (**Table – 4**).

After surgical procedure for RHD-related disease deaths reported by RHD-related valve repair 2 (5%) as per **Table - 5**.

Table - 3: The distribution of the various valvular diseases.

Valve lesion	Male	Female	Total	Percentage
Mitral regurgitation	3	6	9	23.07
MV disease	1	3	4	10.25
MS and AR disease	1	0	1	2.56
Mitral stenosis	8	14	22	56.41
Aortic regurgitation	1	2	3	7.6
Total	14	25	39	100

Figure - 1: Valvular affection in rheumatic heart disease.

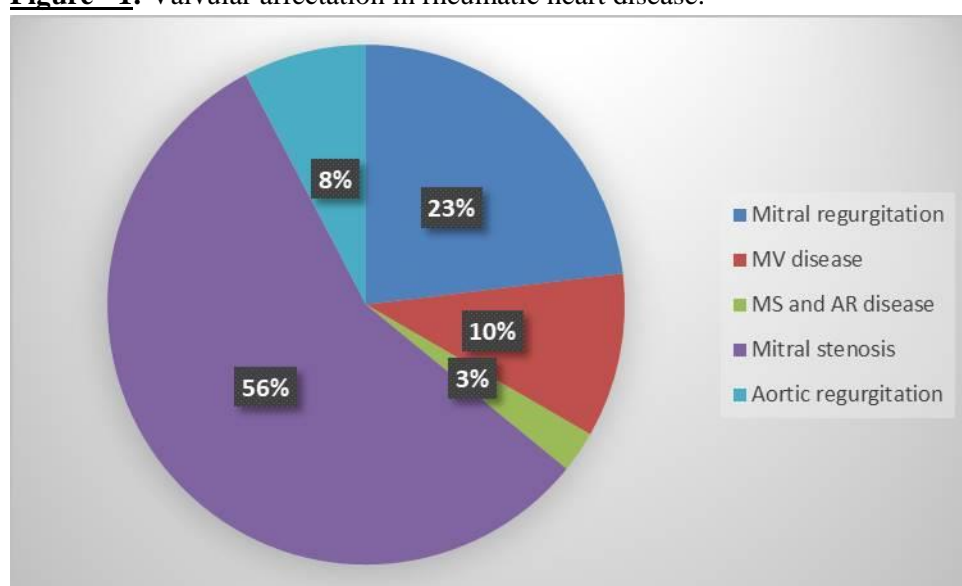


Table - 4: Complication of RHD seen at Echocardiography.

Complication	Number	Percentage
Pulmonary hypertension	25	64.10
Valvular cardiomyopathy	3	7.69
Functional TR	12	30.76
Infective endocarditis	1	2.56
Atrial fibrillation	1	2.56
Thrombus	7	17.9

Discussion

Study was characterized by the comparatively young age of our patients: 20 -30 years of age group was most affected age group following 31-40 years most of the people are between 20-40 years (**Table - 1**). This age range is common among countries of similar socio-economic

levels such as China, India, Iran, Turkey and Tunisia (**Table - 6**).

The distribution of patients by sex in our patients as male to female ratio is around 1:1.7 showing female predominance (**Table - 1**). Predominance of females is found in most studies [5-9]. The females were predominantly involved due to

RHD than males probably because of lack of proper health care and treatment during childhood. The social stigmata and disparity among the genders still prevails in the Indian rural community. Conversely, other studies from these regions show that there are no differences in the sex specific prevalence of RHD [10,

11]. None of the studies we reviewed were able to identify an explanation for the difference in sex specific prevalence. However, Padmavati [12] has suggested that the high rates of RHD among females in India can be attributed to the likelihood that women are housebound, thus more likely to be exposed to overcrowding.

Table - 5: Outcome of valve surgery within hospital.

Variables	RHD (N = 39)
Ventilation (hours)	11.0±2.3
Intensive care unit (ICU) stay (hours)	43.3±6.7
Post procedure length of stay (days)	8.0±1.4
Re-operation for valve dysfunction	1(2.5%)
Deep sternal wound infection (%)	1(2.5%)
Anticoagulant complication (bleeding or embolization) (%)	1(2.5%)
Heart failure (%)	1(2.5%)
Mortality	2(5%)

Table - 6: Comparison of age effected in various studies with our study.

Various studies	Countries	Age effected with RHD
Alsoufi [5]	Canada	5 th decade
Grinda [6]	France	6 th decade
Akay [7]	Turkey	4 th decade
Duren D.R. [8]	Iran	4 th decade
Parks T [9]	India	3 rd decade
Our study	India (Telangana)	3 rd decade

Table - 7: Comparison of present study with other studies.

Study	Mitral Disease	Mitral regurgitation	Mitral Stenosis
Alsoufi [5]	34%	35%	31%
Zühlke [22]	59%	11%	30%
Hanna [23]	14%	28%	58%
Duren D.R. [8]	7%	74%	19%
Steer AC [24]	56.9%	12.5%	30.6%
Our study	23.07%	10.25%	56.4%

Radiographically, the presence of cardiomegaly is noted in all patients of our study. This pattern indicates that all patients were operated on at an advanced stage, with valvar defects having had time to ring significantly on the heart chambers. On echocardiography, in present study majority of cases are of mitral stenosis in 56.4%. Results are in accordance Hanna et al study with rates of 58% (Table - 3 and Figure - 1). There was an

occurrence of mitral disease in 23.07% in present study which is nearly similar with study conducted by Alsoufi, et al. [5] with 34%. Mitral regurgitation in our study is (10.2 %) in correlation with study done by Zühlke, et al. [22] (11%) and Shinn, et al. (12.5%) (Table - 7). Sanyal S, Berry A, Duggal S, et al. [13] in a prospective study from North India described the chronic MR as the most common form of RHD

in children and young adults whereas MS is increasingly common in patients in the fourth to sixth decades of life.

25(64.1%) patients had secondary pulmonary hypertension (**Table - 4**) in our study.

Tandon, et al. [14] and Chopra, et al. [15] have reported plexiform lesion in 4% of their autopsy studies. PAH usually regresses following a successful balloon mitral valvotomy, but it has been observed that Pulmonary artery pressure fails to regress in a significant percentage of patients [16, 17]. Secondary pulmonary hypertension in the early phase is due in large part to reactive changes in the pulmonary vascular resistance. In mitral and aortic valve disease, the left ventricle becomes hypertrophic and less distensible, leading to increased LV end-diastolic pressure. This causes increased work of the left atrium (LA), leading to hypertrophy and enlargement of the atrium. The output of the left atrium decreases and pulmonary hypertension results.

The finding of vegetations in patients with established valvular heart disease suggested infective endocarditis. 2.5% of the patients had vegetations, all of which were attached to the mitral valve. RHD is a known predisposing condition to the development of infective endocarditis. It has been shown to be the pre-existing condition for 66% of cases of infective endocarditis in two studies in different parts of Nigeria [18].

The echocardiography scan helped in the assessment of the structure of the affected valves and haemodynamic status of the heart (left ventricular function) and complications. In present study, the intervention was a primary type of intervention in 97.5% of cases, a reoperation response in 2.5% of cases (Table - 5). Sometimes the surgical intervention achieves ideal timing, but for lack of means, many patients cannot access surgery.

There are many studies conducted to estimate the disease burden of rheumatic heart disease in different parts of the world. These show that the populations living in underdeveloped province are suffering more from the disease. Soudarssanane, et al. [19] suggested that primary prevention is the cost effective in the prevention of rheumatic fever and rheumatic heart disease. Manji, et al. [20] suggested that echocardiographic screening and secondary prophylaxis are the best strategies for the prevention of RHD. A high index of suspicion is required for diagnosing acute rheumatic fever cases who present with features of arthritis mainly. Isolated arthritis is the presenting symptom in 14-42% of patients. Scaling up access to both cardiac surgery and medical interventions to address RHD will require increased financing for health services. Additionally, there is need to support research on strategies for prevention and early detection [21]. Concerted efforts to control RF/RHD must be bolstered as soon as possible in the developing world so that progress can be made towards eradicating what is an entirely preventable disease.

The Awareness, Surveillance, Advocacy, Prevention proposal is a comprehensive programme for the control of RF and RHD that should adopted all over India. In India the Rupnaga District Project was launched to train school teachers to identify suspected cases of RF. School-based education is an effective strategy to target young people most at risk of RF and RHD. Education can be incorporated into regular health education classes. This may include a range of health and hygiene messages; hand hygiene, healthy eating and tobacco control education. Health messaging can occur alongside other education initiatives. In Kenya, for example, school children were taught about RF/RHD in conjunction with healthy diet education.

Incorporating interventional services into RHD control programmes has a number of potential benefits as Maximise the benefit of surgery by ensuring the most suitable candidates receive

intervention, strengthen capacity for post-operative follow up, including the continuation of secondary prophylaxis and anticoagulation. Humanitarian cardiac surgical programs typically have far greater fundraising capacity than local, register based RHD control programmes. Working together may make it possible to distribute these resources more equitably to support both treatment and intervention.

Conclusion

Rheumatic mitral valvulopathy remains a disease frequent in our country and poses a public health problem. It is often associated with other valvulopathies. We find that the population of the mitral valves arrives at the stage surgery at an average age of 41 years; with a female predominance in complex socio-cultural realities and environment.

Involvement of the valve results in valve regurgitation and/or stenosis and when surgery is indicated, Valve replacement is usually necessary and they have good outcomes even if they are operated with severely regurgitation or stenosis.

Rheumatic valve repair surgery maybe preferred surgery for eligible patients due to limited financial and access to medical facilities particularly for the added burden of long term follow up anticoagulation control in patients with mechanical valve replacement. RHD remains a burden in the resource-depleted Province of India

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