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Long-Term Follow-Up of Adult Patients with Non-severe Initial Disease Presented with Rheumatic Mitral Stenosis

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Abstract:

A retrospective cohort analysis was conducted on patients who were receiving treatment at a single center for rheumatic Mitral Stenosis (MS). 50 patients with mild to moderate MS who were at least 30 years old at the time of initial echocardiography were included. From a computerized database, demographic information, medical history, echocardiographic reports spanning a minimum of ten years, and pertinent complications were extracted. Results: During a duration of 13.4 ± 2.51 years, the severity of stenosis did not progress significantly in 34 patients. The ultimate echocardiographic evaluation identified two cohorts distinguished by a statistically significant disparity in mean valvular pressure gradient (7.38 ± 3.63 vs. 9.6 ± 2.75 mm Hg, $p < 0.05$) and mitral valve area (1.73 ± 0.67 vs. 1.2 ± 0.34 cm2, $p < 0.05$). When comparing patients with quiescent MS (group A) to patients with progressive disease (group B), it was observed that group B contained a greater proportion of patients (OR 9.147, $p = 0.024$). There were no notable disparities observed in the remaining parameters. Despite their prevalence, complications such as atrial fibrillation, cerebral ischemic events, and impaired right ventricle function did not differ significantly between the groups from a statistical standpoint. In our investigation, we identified an indolent natural progression of rheumatic MS. Notwithstanding this discovery, it retains the potential for adverse consequences.

Key words: Rheumatic heart disease, Mitral Stenosis, Streptococcus infection, Rheumatic fever, Echocardiography, Fibrosis.

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Introduction:

Rheumatic heart disease (RHD) poses a significant public health challenge globally, particularly in regions with limited healthcare resources. Among its various forms, rheumatic mitral stenosis (MS) is a common complication of acute rheumatic fever that affects millions of people worldwide [1,2]. Although developed countries have seen a decline in rheumatic MS due to improved healthcare and living conditions, the disease remains prevalent in low and middle-income countries where rheumatic fever is endemic [3-5]. Despite efforts to prevent rheumatic fever, many patients still present with mild initial symptoms that require ongoing monitoring for effective management [6]. It is crucial to understand the natural progression and long-term consequences of rheumatic mitral stenosis in adult patients with non-severe initial disease to refine their clinical management and enhance their quality of life [1,5]. This introduction aims to provide a comprehensive overview of rheumatic mitral stenosis, including its epidemiology, pathophysiology, clinical manifestations, diagnosis, and treatment [6]. Emphasis will be placed on the long-term monitoring of adult patients who initially present with non-severe disease. Rheumatic MS not only poses a medical threat but also has significant socioeconomic consequences, as it commonly affects individuals during their most productive years [7]. The condition arises from persistent inflammation and fibrosis of the mitral valve due to an autoimmune response triggered by group A Streptococcus infection [8]. Acute rheumatic fever, which mainly affects children between 5 and 15 years old, can cause coronary valve injury, specifically to the mitral valve [9,10]. If left untreated, prolonged episodes of acute rheumatic fever or persistent subclinical rheumatic activity may lead to thickening, calcification, and fibrosis of the chordae tendineae and leaflets of the mitral valve [5]. This can result in a decrease in the valve orifice area and obstruction of valve motion, ultimately causing mitral stenosis [6]. In certain situations, additional diagnostic tests like cardiac magnetic resonance imaging, transesophageal echocardiography, and cardiac catheterization might be suggested to gain a deeper understanding of the extent of valve involvement and evaluate the suitability of intervention [5-9]. The objectives of this research endeavor are to delineate the course of stenosis in adult patients with rheumatic MS, ascertain the factors that may predict its progression, and evaluate the prevalence of complications.

Materials & methods:

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The present study authors examined the echocardiographic data of 75 Mitral Stenosis (MS) patients who underwent two or more assessments at least 10 years apart as part of a retrospective population-based study conducted in the Cardiology Department of Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha. Out of these, 25 patients were excluded from the analysis due to various reasons, including severe stenosis at the time of initial echocardiographic evaluation, severe mitral regurgitation and/or aortic stenosis affecting cardiac hemodynamics, and senile calcific multiple sclerosis. 50 MS were recruited into the present study. The Institutional Ethics Committee approved the study. We collected the following echocardiographic parameters from the initial and final study reports of the patients: mean ventricular ejection fraction (MVEF), systolic pulmonary artery pressure (SBP), size and function of the left and right ventricles, and the presence or absence of any further valvulopathies. We used the EAE/ASE standards [5] to classify the MVA severity grade and mean gradient for each subject. When the mean gradient grade differed from the MVA grade, we combined the two to determine the overall severity. We employed an empirical grading system from 1 to 5, with 1 representing mild, 2 mild-moderate, 3 moderate, 4 moderate-severe, and 5 severe as the possible severity ratings. We measured the severity of the stenosis in the first and last echocardiographic evaluations using this scale. We tracked the progression of stenosis by comparing its severity at the beginning and end of the follow-up period. If the severity increased by one point, we categorized the disease progression as indolent. If it increased by two points or more, we categorized it as progressive. We then divided the study population in half, with one group comprising patients with slow-progressing disease and the other comprising patients with more active disease. By analyzing the demographics and complication rates of each subgroup, we identified protective and aggravating factors.

Statistical analysis:

We used statistical tests, such as the t test and $\chi 2$ test, to compare sociodemographic, echocardiographic, and clinical differences between the two groups. In our analysis, we used multivariate logistic regression to examine how sociodemographic factors, specifically gender, ethnicity, and age of first echocardiographic assessment, impacted disease development. We found no significant interactions between these variables when analyzed individually. A p value of less

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than 0.05 was considered statistically significant, and we calculated 95% confidence intervals and odds ratios accordingly. All statistical analyses were conducted using SPSS 23.

Results:

Fifty patients were included in the study after exclusions were made as described in the Materials and Methods section. Of these, 34 patients had mild condition while the remaining 16 had a worsening condition.

The final echocardiographic assessment demonstrated higher MVA values in group A, which comprised patients with indolent disease, compared to group B, which comprised patients with progressive disease (1.73 ± 0.67 vs. 1.2 ± 0.34 cm2, $p < 0.05$). Patients in group A had significantly lower final mean pressure gradient values than those in group B (7.38 ± 3.63 vs. 9.6 ± 2.75 mm Hg, $p < 0.05$). Furthermore, there were statistically significant differences observed in the annual mean gradient increasing rate and MVA decreasing rate among subgroups, with patients in group A experiencing an annual decrease in MVA of 0.029 cm2, while patients in group B had a rate of 0.051 cm2 ($p < 0.05$). In contrast, group A patients had an annual increase in mean gradient of 0.040 mm Hg compared to group B patients ($p < 0.001$). No statistically significant variations were observed in the incidence rate of severe complications among patients with indolent or progressive disease. Atrial fibrillation was observed in most patients, 40 patients in both subgroups. Patients in group B tended to develop atrial fibrillation earlier, as measured in years from the initial echocardiographic assessment (5.7 ± 3.61 vs. 7.83 ± 4.43 years, $p = 0.562$), although this difference was not statistically significant. There was no significant difference observed in terms of the occurrence of cerebral ischemic events or the duration from the initial echocardiographic evaluation to the occurrence of a stroke between the two groups.

Discussion:

In general, the progression of rheumatic MS commences nearly concurrently with its diagnosis: certain individuals may undergo a significant and swift progression, manifesting symptoms in adolescence; conversely, others may encounter a more gradual progression [1, 8, 11]. There is a lack of agreement within the medical community and literature concerning the natural progression

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of rheumatic MS in adults who present with mild disease during the initial echocardiographic evaluation. According to the EAE/ASE classification, the disease did not worsen by more than one degree over a period of 14.2 ± 3.49 years in most of our participants, suggesting an indolent disposition.

It is noteworthy that our analysis did not reveal any statistically significant distinction in the occurrence rate of major complications between the two subgroups: specifically, 40 patients in both subgroups experienced atrial fibrillation, with an average duration of 5.5 years from the initial echocardiographic evaluation in group B and 8.6 years in group A. A total of 15 out of 50 patients experienced cerebral ischemic events subsequent to the initial echocardiographic evaluation. Seven patients encountered more than one occurrence. Rheumatic disease may be associated with the elevated incidence of atrial fibrillation and stroke; nevertheless, the prevalence of cardiovascular risk factors, including hypertension and diabetes, may also play a role in this high rate of complications. Our study possesses specific merits. An illustration of this can be seen in the study's strength: the mean follow-up duration of 10 years. This length of time affords more dependable data and enhances comprehension of the disease's natural progression and historical development, in contrast to prior research that utilized follow-up periods varying study periods [7-10], which focused primarily on assessing survival over time. Furthermore, the way the mitral valve stenosis was described at that time was through physical examination, as echocardiographic evaluations were not yet established. There are also some limitations to our investigation. To begin with, this analysis is retrospective, which entails all the inherent limitations of that type of analysis. Furthermore, despite the echocardiographic evaluations being conducted in accordance with predetermined standards, minor inconsistencies in the exact measurements executed by the technicians during the examination cannot be disregarded (although a distinction between the subgroups in this regard would not necessarily be anticipated). In the present study, the aspect of living conditions among the patients under examination was not specifically examined. It is plausible that the patients involved shared similar access to medical care and living conditions as the study population; in such a case, the observed difference may be different and unrelated to hygiene or healthcare.

Conclusion:

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In most young adults with non-severe rheumatic MS, the disease progression is gradual. However, severe valvular issues can still happen. Our study also shows that those with the disposition patients are more prone to progressive illness. Thus, cardiologists should consider stronger primary prevention measures and more follow-up visits.

Conflict of interest:

None.

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