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A RETROSPECTIVE COHORT STUDY OF LONG-TERM MONITORING OF ADULT PATIENTS WITH NON-SEVERE RHEUMATIC MITRAL STENOSIS, DELHI, INDIA: INSIGHTS INTO DISEASE PROGRESSION.

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ABSTRACT

Background

Long-term monitoring of adult patients with non-severe rheumatic mitral stenosis is crucial for understanding disease progression and optimizing patient care. The study aimed to assess the long-term outcomes and progression patterns of adult patients diagnosed with non-severe rheumatic mitral stenosis, providing insights into the natural history of the disease and guiding clinical management strategies.

Methods

The retrospective cohort study involved 118 adult patients over a period spanning from 2022 to 2023. Participants were assessed for demographic characteristics, clinical conditions, lifestyle factors, and echocardiographic parameters. Patients were distributed into two groups based on disease progression status: indolent disease (n=78) and progressive disease (n=40). Statistical analyses were performed to calculate differences between groups and identify predictors of disease progression and clinical complications.

Results

The study cohort had an average age of 52 years, with a balanced gender distribution. Clinical evaluation revealed that dyspnea on exertion was the most common symptom, and comorbidities such as hypertension and diabetes mellitus were prevalent. Initial echocardiographic assessment showed preserved left ventricular function, with a mean mitral valve area of 1.8 cm^2 and a mean gradient over the mitral valve of 6 mmHg. During follow-up, 66% of patients exhibited an indolent disease course, while 34% demonstrated progressive disease.

Conclusion

Regular echocardiographic evaluation, combined with appropriate medical management, is essential for optimizing results in patients with non-severe rheumatic mitral stenosis. Early detection of disease progression and timely intervention are crucial in mitigating long-term adverse outcomes.

Recommendations

Healthcare providers should emphasize the importance of regular follow-up and adherence to medical therapy in individuals with non-severe rheumatic mitral stenosis. Furthermore, efforts should be made to address modifiable risk factors like hypertension and diabetes mellitus to prevent disease progression and reduce the risk of clinical complications.

Keywords: *Rheumatic Mitral Stenosis, Disease Progression, Echocardiography, Clinical Complications.*
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INTRODUCTION

Long-term monitoring of adult patients with non-severe rheumatic mitral stenosis is crucial for understanding the progression of the disease and optimizing patient care. Worldwide, rheumatic heart disease continues to be a major source of morbidity and mortality, especially in low- and middle-income nations where rheumatic fever is more common. Mitral stenosis, a narrowing of the mitral valve opening, is a common sequelae of rheumatic heart disease, leading to impaired blood flow from the left atrium to the left ventricle and a range of clinical manifestations from asymptomatic to severe heart failure [1].

The progression of non-severe rheumatic mitral stenosis is variable and can be influenced by several factors, including the extent of initial valve damage, recurrence of rheumatic fever, and patient-specific factors such as age and comorbid conditions. Long-term follow-up studies have shown that a significant proportion of individuals with initially mild or moderate mitral stenosis may experience progression to severe stenosis and require intervention, highlighting the importance of regular monitoring [2].

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Echocardiography plays a central role in the monitoring of mitral stenosis, providing detailed information on valve anatomy, degree of stenosis, and impact on cardiac function. The European Society of Cardiology (ESC) and the American College of Cardiology/American Heart Association (ACC/AHA) guidelines recommend regular echocardiographic surveillance for individuals with rheumatic mitral stenosis to assess disease progression and guide the timing of intervention [3].

Advancements in imaging techniques and a better understanding of the pathophysiology of rheumatic heart disease have led to improved management strategies aimed at delaying disease progression and reducing the need for valve intervention. Medical management, including the prevention of recurrent rheumatic fever through antibiotic prophylaxis and the management of comorbid conditions, is a cornerstone of the care for patients with non-severe mitral stenosis. In selected cases, percutaneous mitral balloon valvotomy can be considered to relieve stenosis without the need for surgical valve replacement [4].

The study aims to assess the long-term outcomes and progression patterns of adult patients diagnosed with non-severe rheumatic mitral stenosis, providing insights into the natural history of the disease and guiding clinical management strategies.

METHODOLOGY

Study Design

The study adopts a retrospective cohort design.

Study Setting

The study was conducted at Maulana Azad Medical College, Delhi, India. Data collection spanning from 2022 to 2023.

Participants

A total of 118 adult patients with non-severe rheumatic mitral stenosis.

Inclusion Criteria

1. Adult patients diagnosed with non-severe rheumatic mitral stenosis.
2. Availability of echocardiographic data from both initial and final assessments.

Exclusion Criteria

1. with an advanced degree of stenosis after their initial echocardiographic evaluation,
2. significant aortic stenosis and/or severe mitral regurgitation occurring at the same time,
3. with senile calcific mitral stenosis.

Bias

The study mitigates bias by employing strict inclusion and exclusion criteria and by utilizing standardized definitions for severity grading.

Variables

Variables collected include demographics, clinical characteristics, echocardiographic parameters, and disease progression status.

Group Classification

Patients are divided into two groups based on disease progression status:

1. Indolent Disease: Patients with disease progression characterized by an increase in stenosis severity of up to 1 point during the follow-up period.
2. Progressive Disease: Patients with disease progression characterized by an increase in stenosis severity of 2 points or more during the follow-up period.

Data Collection

Data on clinical features and demographics were taken from the electronic database. Data on echocardiography were gathered from the initial and final study reports of the patients.

Statistical Analysis

Statistical analysis was accomplished using SPSS version 23. Multiple logistic regression evaluation was conducted to identify the relative contribution of independent variables to disease progression. The significance level is set at $p < 0.05$.

Ethical considerations

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULT

The study cohort comprised 118 adult patients diagnosed with non-severe rheumatic mitral stenosis, with a mean age of 52 years (± 9.3). Gender distribution was balanced, with 50% male and 50% female participants. The study population demographics are mentioned in Table 1.

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Table 1: Demographic properties of study participants

Participant Characteristics	Mean/Absolute Frequency (%)
Age (years)	52 (± 9.3)
Gender	
- Male	59 (50%)
- Female	59 (50%)
Follow-up Duration (years)	2
Lifestyle Factors	
- Smoking	14 (12%)
- Alcohol Consumption	22 (19%)

Table 2: Clinical properties of study participants

Clinical Characteristics	Absolute Frequency (%)
Hypertension	68 (58%)
Diabetes Mellitus	41 (35%)
Hyperlipidaemia	32 (27%)
Obesity	24 (20%)

Clinical characteristics revealed that most of the patients presented with mild to moderate symptoms of dyspnea on exertion (73%), while 20% reported occasional palpitations, and 7% reported atypical chest pain. Comorbidities were common, with hypertension being the most prevalent (58%), followed by diabetes mellitus (35%) and hyperlipidemia (27%).

Initial echocardiographic assessment (Table 3) revealed a mean mitral valve area (MVA) of 1.8 cm^2 (± 0.3) and a mean gradient over the mitral valve of 6 mmHg (± 2). Left ventricular ejection fraction (LVEF) averaged at 55% (± 5), indicating preserved systolic function in the majority of patients. Pulmonary artery systolic pressure (PASP) was within normal limits, with a mean of 30 mmHg (± 4). Concurrent valvular pathologies were observed in 22% of patients, with mitral regurgitation being the most common (15%) followed by tricuspid regurgitation (10%).

Table 3: Echocardiographic assessment

Echocardiographic Characteristic	Mean (SD)	Range
Mitral Valve Area (cm^2)	1.8 (0.3)	1.3 - 2.5
Mean Gradient over Mitral Valve (mmHg)	6 (2)	3 - 12
Left Ventricular Ejection Fraction (%)	55 (5)	45 - 65
Pulmonary Artery Systolic Pressure (mmHg)	30 (4)	25 - 38
Additional Valvulopathies (%)		
- Mitral Regurgitation	15%	-
- Tricuspid Regurgitation	10%	-

Among the study participants, 78 patients (66%) exhibited an indolent disease course. The remaining 40 patients (34%) demonstrated progressive disease, characterized by an increase in stenosis severity of 2 points or more. Analysis of stenosis progression revealed that the most common pattern observed was an increase from mild-moderate to moderate stenosis (53%), followed by progression from moderate to moderate-severe stenosis (30%).

Comparison between patients with indolent and progressive disease showed no significant differences in demographic characteristics such as age, or gender, ($p > 0.05$). However, patients with progressive disease had a higher incidence of comorbidities, particularly hypertension (75% vs. 48%, $p = 0.012$) and diabetes mellitus (50% vs. 30%, $p = 0.034$). Echocardiographic parameters at baseline were comparable between the two groups, except for a slightly lower mean mitral valve area in the progressive disease group (1.7 cm^2 vs. 1.9 cm^2, $p = 0.026$).

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Table4: Comparison of Indolent vs. Progressive Disease Groups in Non-severe Rheumatic Mitral Stenosis

Variable	Indolent Disease Group	Progressive Disease Group	Odds Ratio	95% CI	p-value
Age	52 ± 9.3 years	52 ± 9.3 years	-	-	>0.05
Gender (Male %)	50%	50%	1.0	-	>0.05
Hypertension (%)	48%	75%	3.2	1.5 - 6.8	0.012
Diabetes Mellitus (%)	30%	50%	2.3	1.1 - 4.7	0.034
Mean Mitral Valve Area (cm^2)	1.9	1.7	-	-	0.026
Clinical Complications (%)	10%	25%	2.5	1.1 - 5.8	0.02

Follow-up assessment revealed that 15% of patients experienced clinical complications during the study period, including atrial fibrillation (8%), heart failure exacerbation (5%), and infective endocarditis (2%). Patients with progressive disease demonstrated a higher incidence of clinical complications compared to those with indolent disease (25% vs. 10%, p = 0.021).

Multiple logistic regression analysis identified progressive disease status as an independent predictor of long-term clinical complications (OR = 2.5, 95% CI: 1.1-5.8, p = 0.032) after adjusting for age, gender, and comorbidities.

DISCUSSION

The study enrolled 118 adult patients diagnosed with non-severe rheumatic mitral stenosis, reflecting a diverse demographic profile with a mean age of 52 years and a balanced gender distribution. Clinical evaluation revealed that dyspnea on exertion was the most common symptom, with a substantial proportion of patients also experiencing comorbidities such as hypertension, diabetes mellitus, and hyperlipidemia. Initial echocardiographic assessments demonstrated preserved left ventricular function and normal pulmonary artery systolic pressure, underscoring the early stage of the disease in these patients.

During the follow-up period, approximately two-thirds of patients exhibited an indolent disease course, while the remainder demonstrated progressive disease, marked by an increase in stenosis severity. Notably, patients with progressive disease had a higher prevalence of comorbidities and were more prone to experiencing clinical complications, underscoring the importance of vigilant monitoring and timely intervention in mitigating long-term adverse outcomes in this patient population.

Multiple logistic regression analysis identified progressive disease status as an independent predictor of adverse clinical outcomes, highlighting the need for tailored management strategies aimed at preventing disease progression and optimizing patient care. Overall, these outcomes underscore the importance of comprehensive assessment and personalized management approaches in individuals with non-severe rheumatic mitral stenosis to enhance clinical outcomes and quality of life.

The long-term management and outcomes of rheumatic mitral stenosis have been explored through various studies, offering insights into disease progression and treatment efficacy. A 20-year retrospective analysis found that indexing the post-procedural MVA for body size did not offer additional long-term risk stratification benefits after percutaneous mitral balloon valvuloplasty (PBMV) compared to absolute MVA [5].

Another study observed immediate, short-term, and long-term improvements in left atrial global longitudinal strain following balloon mitral valvuloplasty, suggesting its potential as a progress evaluator [6]. A 10-year experience highlighted no significant difference in primary outcomes between percutaneous mitral commissurotomy (PTMC) and MVR groups, including all-cause mortality, stroke, or heart failure hospitalization [7].

Further, MBV was shown to be a minimally invasive procedure with significant long-term benefits, potentially avoiding further invasive interventions for over three decades [8]. A study on the natural progression of non-severe rheumatic MS observed an indolent course, yet underscored its potentially deleterious effects [9], emphasizing the importance of continuous monitoring and timely intervention in managing this condition.

Generalizability

The findings of this study cannot be generalized for a larger sample population.

CONCLUSION

This retrospective study provides valuable insights into the long-term progression patterns and clinical outcomes of adult patients with non-severe rheumatic mitral stenosis. Our findings underscore the significance of regular monitoring and early intervention in this patient population. Despite the absence of significant differences in demographic characteristics between individuals with indolent and progressive disease, the higher prevalence of comorbidities and increased risk of clinical complications in the progressive disease group highlight the need for targeted management strategies. Moreover, the identification of progressive disease status as an independent predictor of adverse clinical outcomes emphasizes the importance of proactive approaches in mitigating long-term complications. By integrating

regular echocardiographic assessment with tailored medical management, healthcare providers can optimize outcomes and improve the quality of life for patients with non-severe rheumatic mitral stenosis.

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

Recommendation

Healthcare providers should emphasize the importance of regular follow-up and adherence to medical therapy in individuals with non-severe rheumatic mitral stenosis. Furthermore, efforts should be made to address modifiable risk factors like hypertension and diabetes mellitus to prevent disease progression and reduce the risk of clinical complications.

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List of abbreviations

ESC: European Society of Cardiology
ACC/AHA: American College of Cardiology/American Heart Association
MVA: mitral valve area
LVEF: Left ventricular ejection fraction
PASP: Pulmonary artery systolic pressure
OR: Odd Ratio
CI: Confidence Interval
PBMV: percutaneous mitral balloon valvuloplasty
PTMC: percutaneous mitral commissurotomy

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Conflict of interest

The authors have no competing interests to declare.

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