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Original Research Article

Long-Term Follow-Up of Adult Patients with Non-Severe Initial Rheumatic Mitral Stenosis: A Retrospective Study

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Abstract:

Background: Rheumatic mitral stenosis (MS) is a chronic valvular heart disease resulting from rheumatic fever, leading to progressive mitral valve narrowing. The study aimed to assess non-severe initial rheumatic mitral stenosis progression and identify associated risk factors.

Methods: The study conducted a retrospective analysis of 110 adult patients with non-severe initial rheumatic mitral stenosis diagnosed between January 2021 and June 2023, with a median 1.5-year follow-up. Demographics, echocardiographic data, medical treatments, and clinical outcomes were analyzed. Kaplan-Meier and multivariate regression models assessed disease progression and predictors.

Results: During follow-up, 37% progressed to severe MS, and 24% experienced clinical events, including heart failure (15%) and atrial fibrillation (9%). Echocardiography showed an annual mean transmitral gradient increase of 1.5 mmHg and a mitral valve area decrease of 0.2 cm^2. Younger age at diagnosis correlated significantly with disease progression ($p < 0.05$), and suboptimal medical management increased clinical event risk ($p < 0.05$). Appropriate medical therapy lowered severe MS ($p < 0.01$) and clinical event risk ($p < 0.05$).

Conclusion*:* The study provides insights into non-severe initial rheumatic mitral stenosis in adults, emphasizing the importance of regular follow-up and optimal medical management to mitigate disease progression and improve outcomes. Early diagnosis and effective intervention are crucial to prevent severe rheumatic mitral stenosis development.

Recommendation: Regular follow-up and timely, optimal medical management are essential in adult patients with non-severe initial rheumatic mitral stenosis to prevent disease progression and improve clinical outcomes. Early diagnosis and appropriate medical intervention play a crucial role in optimizing patient care.

Keywords: Rheumatic mitral stenosis, Disease progression, Medical management, Clinical outcomes.

Introduction

The management and prognosis of rheumatic mitral stenosis, a consequence of rheumatic heart disease, have been subjects of extensive study due to the condition's significant morbidity and mortality worldwide. Rheumatic heart disease remains a major public health issue, particularly in developing countries, where it is a leading cause of cardiovascular disease. Mitral stenosis, characterized by the narrowing of the mitral valve orifice, is one of the most common manifestations of rheumatic heart disease. It predominantly affects young adults and can lead to various complications, including atrial fibrillation, heart failure, and stroke, if not managed appropriately [1]. The natural history of non-severe initial rheumatic mitral stenosis in adult patients is particularly important for clinicians, as it informs decisions regarding surveillance, medical management, and timing of interventions such as percutaneous mitral balloon valvotomy or surgical valve repair or replacement.

Long-term follow-up studies of adult patients with non-severe initial rheumatic mitral stenosis are crucial for understanding the progression of the disease and for optimizing patient outcomes. These studies help in identifying factors that predict rapid progression and in determining the effectiveness of medical therapies in slowing disease progression. For instance, the role of anticoagulation therapy, beta-blockers, and angiotensin-converting enzyme inhibitors in managing patients with mitral stenosis has been explored, with varying degrees of impact on disease progression and patient outcomes [1, 2].

Moreover, advancements in imaging techniques, such as echocardiography, have greatly enhanced the ability to diagnose mitral stenosis early, assess its severity accurately, and monitor its progression over time. This has significant implications for the

timing of interventions, which can be crucial in preventing the development of complications and in improving the quality of life and survival of patients [3].

The importance of regular follow-up and echocardiographic surveillance cannot be overstated, as these practices enable timely decision-making regarding the need for intervention before the onset of symptoms or the development of severe complications. Furthermore, the impact of socioeconomic factors, access to healthcare, and adherence to follow-up recommendations on the outcomes of patients with rheumatic mitral stenosis also warrants attention, as these factors can significantly influence the disease course and prognosis [4].

The study aimed to assess non-severe initial rheumatic mitral stenosis progression and identify associated risk factors.

Methodology

Study Design: A retrospective cohort design.

Study Setting: The study was conducted at Nalanda Medical College & Hospital, Patna, between January 2021 and June 2023.

Participants: The study included 110 participants.

Inclusion Criteria: Patients were included if they met the following criteria: being an adult (18 years or older), having a diagnosis of non-severe initial rheumatic mitral stenosis, and receiving diagnosis and treatment within the specified study period.

Exclusion Criteria: Patients were excluded if they were below 18 years of age, had other significant cardiac conditions unrelated to mitral stenosis, or had incomplete or missing medical records.

Bias: To minimize potential bias, strict adherence to predefined inclusion and exclusion criteria was maintained during patient selection.

Variables: The study considered various variables such as age at the initial diagnosis and the categorization of medical therapy as optimal or suboptimal, disease progression (dichotomous, indicating whether patients progressed to severe MS) and clinical outcomes (dichotomous, reflecting whether patients experienced clinical events), demographic data, echocardiographic measurements, and time-to-event data.

Data Collection: Data were collected from electronic medical records, encompassing patient demographics. Echocardiographic measurements were collected using standardized protocols by certified echocardiographers, focusing on parameters such as mean transmitral gradient and mitral valve area. These measurements were consistently monitored during follow-up. Details of medical therapies were gathered through a thorough review of electronic medical records, categorizing therapies as "optimal" or "suboptimal." Medication regimens, dosages, and changes over time were documented to assess their impact. Clinical outcomes, including disease progression to severe MS and clinical events like heart failure and atrial fibrillation, were assessed through regular clinical evaluations, medical record reviews, and event confirmation to provide a comprehensive understanding of patient outcomes. Trained healthcare professionals and researchers conducted data collection to ensure precision and consistency.

Statistical Analysis: The statistical analysis was done using SPSS software version 24. Kaplan-Meier survival analysis was utilized to estimate time-to-event outcomes, such as disease progression and clinical events. Significance levels (p-values <0.005) were employed to assess the statistical significance of these associations.

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

Result

Table 1: Clinical characteristics of study population

Demographic Variable	Values
Total Participants	110 (100%)
Age (years)	
- Mean (± SD)	45.5 ± 10.2
- Range	28 - 68
Gender	
- Male	58 (52.7%)
- Female	52 (47.3%)
Disease Progression	
- Progressed to Severe MS	41 (37.3%)
- Did Not Progress	69 (62.7%)
Clinical Events	
- Heart Failure	16 (14.5%)

- Atrial Fibrillation	10 (9.1%)
No Clinical Events	84 (76.4%)
Echocardiographic Parameters (Mean)	
- Mean Transmitral Gradient	5.7 mmHg (± 2.3)
- Mitral Valve Area	2.3 cm² (± 0.4)

In the study of 110 adult patients diagnosed with non-severe initial rheumatic mitral stenosis (MS), the progression of the disease and associated clinical outcomes were evaluated over a median follow-up duration of 1.5 years.

The study cohort had a mean age of 45.5 years (±10.2 years), with a range of 28 to 68 years. The gender distribution was fairly balanced, with 58 (52.7%) male and 52 (47.3%) female participants.

Disease progression from non-severe to severe rheumatic mitral stenosis occurred in 41 (37.3%) of the patients during the follow-up period, underscoring the substantial proportion of individuals who experienced disease progression.

Clinical events were observed in 24% of the patients. Specifically, 16 (14.5%) patients experienced heart failure, indicating a significant clinical burden associated with rheumatic mitral stenosis. Additionally, 10 (9.1%) patients developed atrial fibrillation during the study period, highlighting the propensity for arrhythmias in this population. The majority of patients, 84 (76.4%), did not experience clinical events.

Echocardiographic measurements offered valuable insights into the progression of the disease. The study revealed an annual increase in the mean transmitral gradient by an average of 1.5 mmHg, with a mean value of 5.7 mmHg (±2.3) over the follow-up period. This statistical result underscores the progressive nature of mitral stenosis, with a measurable and consistent rise in pressure gradients across the mitral valve. Furthermore, a decrease in the mitral valve area by 0.2 cm² was noted, with a mean value of 2.3 cm² (±0.4), confirming the gradual reduction in the effective orifice area of the mitral valve. These statistical findings provide quantitative evidence of the anatomical changes associated with the disease, reinforcing the importance of regular echocardiographic monitoring in managing rheumatic mitral stenosis.

The statistical analysis showed that younger age at the time of initial diagnosis was significantly associated with disease progression ($p < 0.05$), suggesting that age plays a role in the likelihood of progressing to severe MS. Additionally, suboptimal medical management was shown to increase the risk of clinical events ($p < 0.05$), underscoring the importance of appropriate medical therapy in mitigating adverse clinical outcomes.

Discussion

In this study involving 110 adult patients diagnosed with non-severe initial rheumatic mitral stenosis, a median follow-up period of 1.5 years unveiled critical insights. Notably, disease progression to severe mitral stenosis was observed in a substantial 37.3% of patients, emphasizing the potential for deterioration over time. Clinical outcomes indicated a notable clinical burden, with 24% of patients experiencing events such as heart failure (14.5%) and atrial fibrillation (9.1%), underscoring the disease's clinical impact.

Echocardiographic data revealed a consistent annual increase in the mean transmitral gradient and a reduction in mitral valve area, providing quantifiable evidence of disease progression. Younger age at initial diagnosis was associated with disease progression, highlighting its influence, while suboptimal medical management significantly heightened the risk of clinical events, emphasizing the critical role of appropriate therapy.

These findings underscore the importance of timely diagnosis, effective medical intervention, and regular echocardiographic monitoring in the management of non-severe rheumatic mitral stenosis to mitigate disease progression and improve patient outcomes.

Studies on rheumatic mitral stenosis (RMS) have provided significant insights into the disease's progression and management outcomes. The mid-term clinical and echocardiographic outcomes of percutaneous transvenous mitral commissurotomy (PTMC) in patients with RMS have demonstrated the procedure's safety and effectiveness, showing significant improvements in mitral valve area, trans-mitral pressure gradient, pulmonary artery systolic pressure, and clinical symptoms, underscoring its role in managing this condition [5]. Further research has highlighted the association between decreased cytokine plasma levels and changes in T-cell activation with hemodynamic improvement and clinical outcomes post-PMC, suggesting the potential use of these markers for monitoring recovery after intervention [6]. Additionally, mid-term outcomes up to 12 years post-PTMC have been influenced by various peri-procedural determinants, with initial mitral valve area having a significant impact on long-term success [7]. Moreover, PTMC has been shown to be safe and efficacious in managing pregnant women with critical mitral stenosis, leading to

significant improvements in clinical symptoms and echocardiographic parameters [8]. These studies collectively emphasize the importance of percutaneous interventions in the management of RMS and the potential for specific biomarkers to guide post-intervention recovery.

Conclusion

In conclusion, this study's results reveal the dynamic nature of non-severe initial rheumatic mitral stenosis, with a significant proportion of patients experiencing disease progression and clinical events. The statistical findings emphasize the critical role of early diagnosis, optimal medical management, and regular echocardiographic monitoring in optimizing patient care and preventing the development of severe rheumatic mitral stenosis.

Limitations: The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of comparison group also poses a limitation for this study's findings.

Recommendation: Regular follow-up and timely, optimal medical management are essential in adult patients with non-severe initial rheumatic mitral stenosis to prevent disease progression and improve clinical outcomes. Early diagnosis and appropriate medical intervention play a crucial role in optimizing patient care.

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List of abbreviations:

1. MS: Mitral Stenosis
2. RMS: Rheumatic Mitral Stenosis
3. PTMC: Percutaneous Transvenous Mitral Commissurotomy
4. SD: Standard Deviation

Conflict of interest: The authors have no competing interests to declare.

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