

Original Research Paper

Clinical Assessment of Mitral Valvular Diseases Requiring Its Prosthetic Replacement

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Abstract

Objectives: The patient's clinical assessment having mitral valvular diseases requiring its prosthetic replacement was done in the current study. **Methods:** The study included 45 selected cases of the mitral valvular lesion that underwent prosthetic replacement of mitral valve admitted in the cardiothoracic surgery department at a tertiary care centre. A detailed history of each patient was taken, and subsequent management and follow up was done. The pre-operative clinical features of the patients were presented in terms of frequencies. **Results:** The patient's peak age group was 31 to 40 years, comprising 42.22%. There was a female predominance with 28 (62.22%) patients. Dyspnea was the presenting feature in all 45 (100%) patients. Valvular lesions of the patients were diagnosed with Mitral stenosis, Mitral regurgitation and combined valvular lesion. In the present study, valvular lesions were predominantly associated with Rheumatic fever's history in 24 (53.33%) patients. Calcification was noted either in valve leaflet or annulus in 12 (26.66%) cases. Calcification was confirmed by pre-operative echocardiography and during the perioperative period. It is equally noted in mitral stenosis cases and combined valvular lesion. The maximum 33 (73.33%) patients belonged to the NYHA Class III, followed by Class IV. The associated other valvular lesions mainly were in 7 (15.55%) cases that belonged to mild aortic regurgitation. 36 (80%) cases were diagnosed with left atrial enlargement followed by right ventricular enlargement for 23 (51.11%) patients. Left atrial hypertrophy was the most common feature for 39 (86.66%) cases. **Conclusion:** During the pre-operative period, clinical assessment is critical to determine the extent of illness and type of valvular diseases. The results of this study are comparable to other similar published clinical observations.

Keywords: Rheumatic heart disease; valvular diseases; quality of life.

Introduction

Implantation of a functional valve is necessary to improve the patient's survival and enhance his quality of life with severely diseased valves.^{1,2} However, the problems associated with these available implants remain a significant concern for a successful long-term outcome for many of such receiving patients. A perfect prosthetic

replacement for every patient is not available until, in 1950, an ideal valve replacement design criterion was laid out.³

A typical valve should allow unobstructed onward flow while it open and no regurgitation while closed. The turbulent blood flow should not be permitted, generating limited hemolysis and stimulation of the clotting cascade. Biocompatible materials with thromboresistant blood-contacting surfaces with a low risk of infection should be used. The durability of the valve, which does not alter the recipient's daily activities, is desirable. Both mechanical and tissue valves have some advantage and disadvantage. Transcatheter aortic valve implantation

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(TAVI) has also emerged as an attractive choice for patients with symptomatic severe aortic stenosis who are ineligible or at excessive risk for conventional surgical aortic valve replacement.⁴

Rheumatic heart disease usually affects the mitral valve resulting in mitral stenosis and regurgitation. Prosthetic valve replacement of it is the usual surgical choice.

Surgical procedures remain the choice for the cardiac surgeon for that haemodynamically relevant valvular lesion of the heart. It has shown consistency in relieving long-lasting symptoms and its superiority over medical treatment.⁵

Therefore, the current study aimed to assess the clinical characteristics of patients having mitral valvular diseases requiring its prosthetic replacement to find the extent of morbidity.

Materials and Methods

The study included 45 selected cases of the mitral valvular lesion that underwent prosthetic replacement of mitral valve admitted in the cardiothoracic surgery department at a tertiary care centre. A detailed history of each patient was taken, and subsequent management and follow up was done. A structured questionnaire including the socio-demographic characteristics of the patients, presenting complains, past history of disease, family history, personnel habits etc. were used to collect the data Functional class of the patients on presentation was done according to the New York Heart Association

(NYHA) functional classification of heart failure.⁷

General physical examination and laboratory examinations were performed. Chest X-rays for posteroanterior (PA) view was performed to identify any kind of ventricular, atrial or pulmonary enlargement and congestion. To detect cardiac abnormalities electrocardiograms were used.

The base-line clinical observations of the study participants were presented as frequencies and percentages. Statistical analysis was performed with the Quick Calcs Online calculator (GraphPad Software).

Ethical clearance was taken before the collection of the data from the institutional ethics committee.

Results

During the study period, 284 (18.94%) out of 1499 total admitted patient to the Cardio-thoracic Department were diagnosed with mitral valvular diseases. Among those 284 patients, 45 cases were selected for prosthetic replacement of the mitral valve, which was 15.84% in relative percentage. The base line characteristics of these 45 selected cases were presented in the current study.

The age of the patients ranged from 14 years to 65 years with mean age 34.11 years. Majority of the patients belonged to the age group of 31 to 40 years comprising 42.22%, while the lowest was for 2.22% in the 61-70 years age group. There was a female predominance with 28 (62.22%) patients in the present study. (Table 1)

Table 1 Age and sex distribution of patients having mitral valvular diseases

| Age Group | Number of Patients | Percentage |
|-----------|--------------------|------------|
| 0-10 yrs | 0 | 0% |
| 11-20 yrs | 5 | 11.11% |
| 21-30 yrs | 12 | 26.66% |
| 31-40 yrs | 19 | 42.22% |
| 41-50yrs | 6 | 13.33% |
| 51-60 yrs | 2 | 4.44% |

Cont... Table 1 Age and sex distribution of patients having mitral valvular diseases

| | | |
|-----------|----|--------|
| 61-70 yrs | 1 | 2.22% |
| Sex | | |
| Male | 17 | 37.77% |
| Female | 28 | 62.22% |

All the patients were symptomatic at the time of the study with Dyspnea on exertion being the commonest presenting feature in all 45 (100%) patients. Congestive heart failure with fluid retention and hepatomegaly were also observed in some patients. (Table 2)

Table 2 Different modes of presentation of the patients

| Symptoms | Number of Patients | Percentage |
|--------------------------|--------------------|------------|
| Dyspnea on exertion | 45 | 100% |
| Palpitation | 44 | 97.77% |
| Chest pain | 13 | 28.88% |
| Congestive heart failure | 5 | 11.11% |

Valvular lesions of the patients were diagnosed with Mitral stenosis, Mitral regurgitation and combined valvular lesion, as shown in Table 3. In the present study, valvular lesions were associated with Rheumatic fever's history predominantly in 24 (53.33%) patients. Diagnosis is confirmed by history, sign and symptoms and inspection during surgery.

Table 3 Different valvular lesions diagnosed

| Valvular Lesions | Number of Patients | Percentage |
|--------------------------|--------------------|------------|
| Mitral stenosis | 11 | 24.44% |
| Mitral regurgitation | 17 | 37.77% |
| Combined valvular lesion | 17 | 37.77% |

Calcification was noted either in valve leaflet or annulus in 12 (26.66%) cases. Calcification was confirmed by pre-operative echocardiography and during the perioperative period. It is equally noted in mitral stenosis cases and combined valvular lesion.

The associated other valvular lesions were mostly in 7 (15.55%) cases that belonged to mild aortic regurgitation. Tricuspid regurgitation was also prevalent among the patient but found to be mild in most cases. (Figure 1)

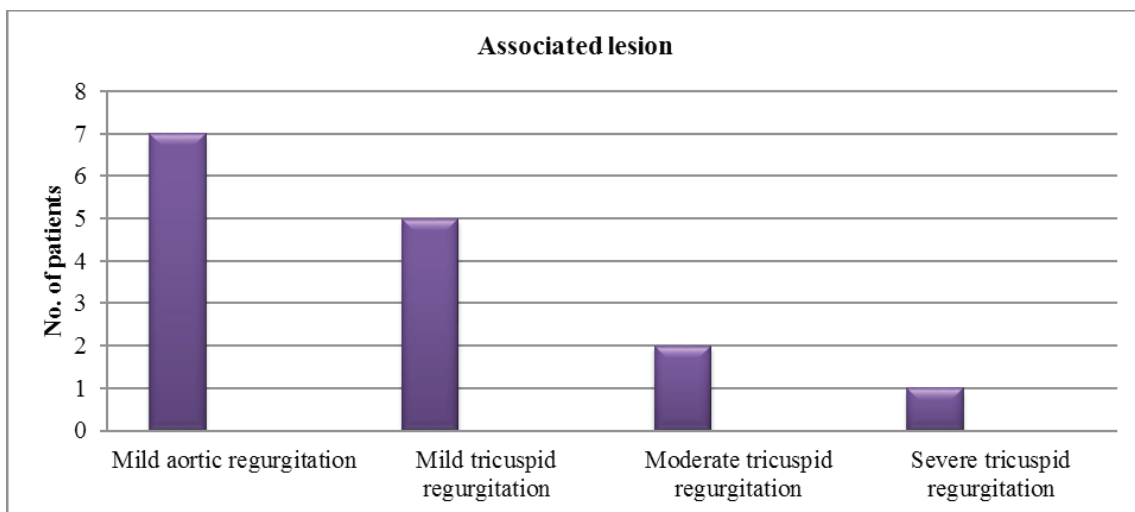


Figure 1 Bar diagram showing the various associated lesion of the patient

The patients’ functional class on presentation as per the New York Heart Association (NYHA) functional classification of heart failure is shown in **Figure 2**. The maximum 33 (73.33%) patients belonged to the NYHA Class III, followed by Class IV.

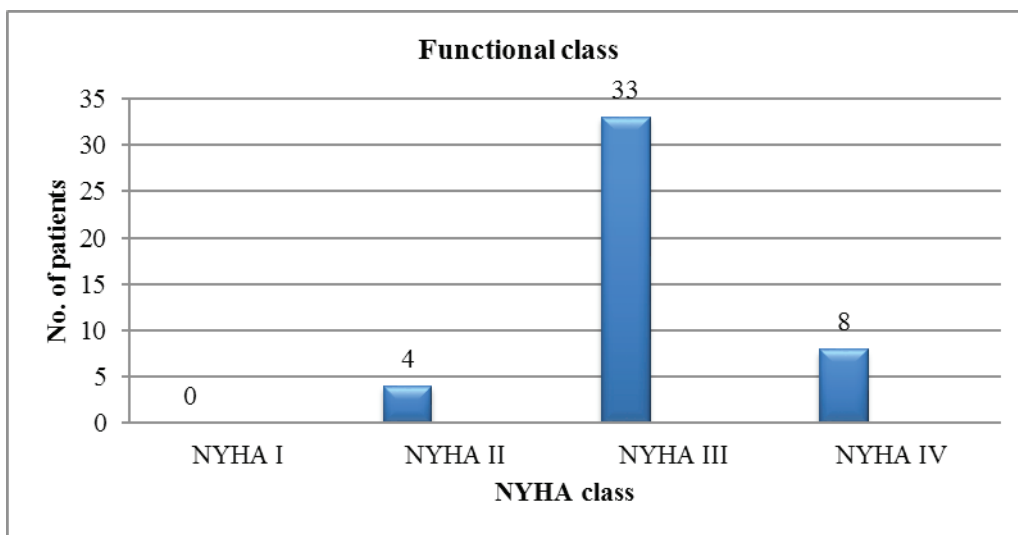


Figure 2 Functional class of the patients on presentation

Chest X-rays was done in all patients pre-operatively. Maximum 36 (80%) cases were diagnosed with left atrial enlargement followed by right ventricular enlargement for 23 (51,11%) patients in PA view of the chest. Pulmonary arterial enlargements were also noted in 64.44% patients.

Table 5 Features in X-rays of the patient having the valvular disease

| Radiographic Findings | Number of Patients | Percentage |
|--------------------------------|--------------------|------------|
| Right ventricular enlargement | 23 | 51.11% |
| Left atrial enlargement | 36 | 80% |
| Left ventricular enlargement | 22 | 48.88% |
| Pulmonary arterial enlargement | 29 | 64.44% |
| Pulmonary congestion | 11 | 24.44% |

In electrocardiography (ECG), 12 lead ECG was done in all patients, as shown in Table 6. Left atrial hypertrophy was the most common feature for 39 (86.66%) cases.

Table 6 ECG findings of the patients

| ECG Findings | Number of Patients | Percentage |
|-------------------------------|--------------------|------------|
| Atrial fibrillation | 12 | 26.66% |
| Left atrial hypertrophy | 39 | 86.66% |
| Left ventricular hypertrophy | 23 | 51.11% |
| Right ventricular hypertrophy | 18 | 40% |

Angiography was done in 13 patients with normal coronary anatomy. However, cardiac catheterization was not considered in this study group.

Discussion

The majority (42.22%) of the cases belonged to the 31 to 40 years age group and found nil aged below 10 years. The incidence of valvular disease increased with age was reported in a recent study.⁸The female predominance with 28 (62.22%) cases in the present research agrees with Carabello BA's studies.⁹

All the patients were symptomatic at the study's time, the commonest being dyspnea on exertion, followed by palpitation and chest pain symptoms. The present study features correlate well with Shaw TR, Sutaria N, Prendergast B.¹⁰Chest pain was not a typical symptom of Mitral stenosis, but a small percentage, conceivably 28.88% of patients with Mitral stenosis, experiences chest discomfort that is indistinguishable from angina pectoris. The reason may be the severe right ventricular hypertension secondary to pulmonary vascular disease or concomitant coronary atherosclerosis, as revealed in a study.¹¹The presentation with congestive heart failure in a small group (11.11%) with fluid retention and hepatomegaly has the similarity with a review of Otto CM.¹²

Patients with mild to moderate Mitral regurgitation may remain asymptomatic with little or no hemodynamic compromise for many years. There is little volume overload of the ventricle and cardiac hemodynamics,

and forward cardiac output remains normal. Even in patients with severe Mitral regurgitation, most remain asymptomatic until the occurrence of left ventricular failure, pulmonary hypertension or the onset of atrial fibrillation.¹³

In the present study, valvular lesions were associated with Rheumatic fever's history predominantly in 24 patients, which is correlated well with the analysis performed by Nataatmadja M, West M, West J¹⁴ and Sagie A, Freitas N, Padial LR.¹⁵A definite history of acute rheumatic fever was obtained from 24 patients and confirmed by valve inspection during surgery.¹⁶In this study, calcification was noted either in valve leaflet or annulus in 12 cases with male predominance.¹⁷Calcification was confirmed by pre-operative echocardiography and during the perioperative period. Calcification is equally observed in mitral stenosis and combined valvular lesion cases.

Right ventricular enlargement, left atrial enlargement, left ventricular enlargement, pulmonary arterial enlargement and pulmonary venous congestion were the most frequent chest x-ray findings in all mitral valvular lesions. In the Mitral stenosis group, left atrial enlargement, right ventricular enlargement, and pulmonary arterial enlargement was predominant in most cases. As a consequence of chronic pressure and

volume overload, the left atrium enlarges. Its altered shape causes several characteristic signs, including straightening the left heart border and losing the aortic window.¹⁸

Enlargement of the pulmonary artery, right ventricle and right atrium (as well as the left atrium) is commonly seen in patients with severe Mitral stenosis; left atrial enlargement results in the appearance of a double density and an elevation of the left mainstem bronchus. In the Mitral regurgitation group, left atrial enlargement and left ventricular enlargement were most predominant. In the combined valvular lesion, left atrial enlargement, right ventricular enlargement, and pulmonary arterial enlargement was the most predominant findings in this study. Acute mitral regurgitation is often not associated with an enlarged heart shadow and may produce only mild left atrial enlargement. Interstitial oedema is seen in patients with acute mitral regurgitation or those with progressive LV failure secondary to chronic mitral regurgitation.¹⁹

In this study, coronary angiography was done routinely in patients 40 years of age or more similar to a study.²⁰ Angiography is done in 13 patients with normal coronary anatomy. Cardiac catheterization can provide important information about the presence and severity of valvular obstruction, valvular regurgitation and intracardiac shunting.

Limitation: The clinical characteristics at base line were only reported in the present paper. Peri-operative and post-operative follow up clinical findings may help in assessing the extent of morbidity and survival of the patients after treatment.

Conclusion

Prosthetic replacement of the mitral valve is required to improve the patient survival and the quality of life of the severely ill person with a diseased valve. During the pre-operative period, clinical assessment is critical to determine the extent of illness and type of valvular diseases. The results of this study are comparable to other similar published clinical observations.

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Ethical Clearance: Taken.

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