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Comparison of Pre and Post Interventional Pulmonary Function Tests in Patients With Mitral Valve Heart Disease - (A Study of 50 cases)

Medical Science

KEYWORDS : Rheumatic mitral valve disease, Pulmonary function tests, Balloon mitral valvotomy, Mitral valve repair.

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ABSTRACT

Valvular heart disease is seen in a large number of patients in India owing to high incidence of rheumatic heart disease. Mitral valve being commonly affected. Mitral valve disease progressively leads to deterioration in the pulmonary functions. Aim of my study is to determine the state of pulmonary function in patients with symptomatic mitral valve disease and to assess the changes in the same after patients undergo operative intervention. The study included 50 patients having symptomatic mitral valve disease and their pulmonary functions were analysed using spirometry. All these patients underwent operative procedures namely Balloon Mitral Valvotomy or Mitral Valve Repair. Their pulmonary functions were assessed again after 6 months and comparative analysis was done with pre interventional status. The study revealed that all patients with symptomatic mitral valve disease had developed restrictive pattern of respiratory dysfunction and following operative intervention most of them benefitted evidently as was observed in spirometric analyses.

INTRODUCTION

Human heart is a four chambered organ guarded by four valves which regulate blood flow across the heart. These valves include;

1. Tricuspid valve; 2. Pulmonary valve; 3. Mitral valve; 4. Aortic valve.

These valves are affected in various conditions, however rheumatic heart disease is the commonest disorder involving heart valves especially in India[1,2,3]. Rheumatic heart disease most commonly affects mitral valve[4]. Incidence of mitral stenosis being highest followed by mitral stenosis with mitral regurgitation followed by mitral regurgitation alone[4]. Patients having rheumatic fever develop mitral valve disease after 5-15 years of the disease. And it takes further 5-10 years to progress from mild symptoms to breathlessness and chest pain to severe symptoms[5]. Mitral valve disease leads to hemodynamic changes which in turn lead to histological alterations in the lung. Pulmonary function tests assess the nature and severity of the disability. The aim of this study is to determine the status of pulmonary functions and quantum of improvement in the same after operative intervention.

AIMS AND OBJECTIVES

1. To study the changes in pulmonary function tests in patients with symptomatic mitral valve disease.
2. To correlate severity in symptomatology and alterations in PFT in patients suffering from mitral valve disease.
3. To study the alterations in pulmonary function tests after mitral valve surgery in patients with mitral valve disease.

MATERIAL AND METHODS

A study of total 50 patients of mitral valve disease was performed to determine the changes in spirometric pulmonary function. Out of this, 40 patients were of mitral stenosis and 10 patients were of mitral regurgitation. The diagnosis was made by clinical, x-ray, electrocardiography and echocardiography studies. Patients selected for study underwent operative procedures. The operative procedures were Balloon mitral valvulotomy for mitral stenosis and Mitral valve repair and/or replacement for mitral regurgitation.

Criteria for selection of patients in present study were:

- Patients with primary pulmonary disease, musculoskeletal chest involvement and smokers were excluded.
- Patients having only mitral valve disease were included.
- All patients were on medical management.
- Detailed history and clinical examination including height and weight measurements were taken.
- Patients were classified according to 'NEWYORK HEART ASSOCIATION CLASSIFICATION'.
- Routine relevant laboratory investigations were done to rule out any major medical illness.
- Echocardiography was done to detect the severity of mitral valve disease as well as pulmonary hypertension and LV dysfunction.
- The operative procedures were Balloon mitral valvulotomy for mitral stenosis and Mitral valve repair and/or replacement for mitral regurgitation.
- Pulmonary function tests were carried out on computerized spirometer in sitting position after explaining the procedure to the patients.
- In patients of mitral stenosis, tests were done 1 month before operation and 6 months after operation.

OBSERVATION

The study revealed slight female preponderance with a female to male ratio of 1.4:1. All patients belonged to age group 16-50 years with mean age being 30.2 years.

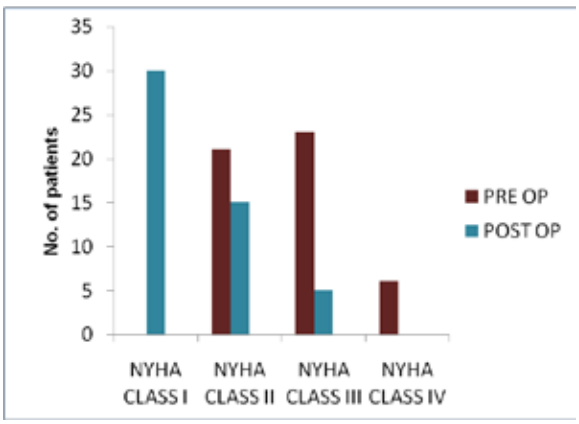
Main presenting complaints were breathlessness and palpitations; clinical signs included left parasternal heave, loud first heart sound and mid diastolic murmur at mitral area, in patients with predominance of mitral stenosis. All patients belonged to NYHA class II to IV depending upon severity of clinical symptoms.

Pulmonary function tests in patients with symptomatic mitral valve disease showed following results;

- All patients had reduced vital capacity with mean vital capacity being 71.08%.
- Reduction in vital capacity was directly correlated with patients' clinical status as defined by NYHA classification.
- Total lung capacity was also reduced.
- There was reduction in both FEV_1 and FVC however FEV1 / FVC was not much reduced.
- Mean FEV1 / FVC % was 83.58% which was suggestive of restrictive pattern of respiratory dysfunction.
- Maximum voluntary ventilation (MVV) as percentage pre-

dicted was significantly reduced in all patients, mean being 63%.

CHART 1: IMPROVEMENT IN CLINICAL STATUS AFTER OPERATIVE INTERVENTION

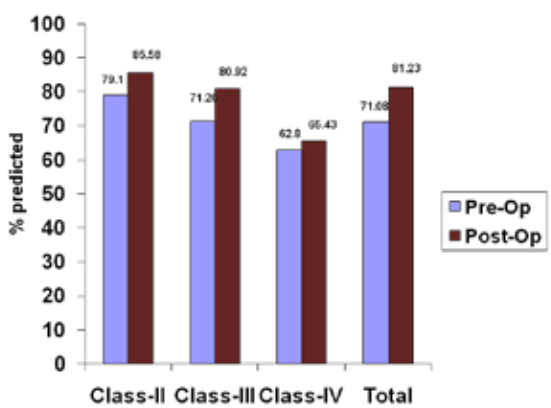


Following operative intervention, significant improvement in clinical status of all patients was noted as evident by NYHA classification.

Post interventional assessment of pulmonary function revealed;

- Improvement was seen in all parameters of pulmonary function tests as evident on spirometric analyses.
- Mean vital capacity rose to 81.23% where as mean FEV_1 / FVC % was found to be 89.94%.
- MVV became 78.82% post operatively.
- Improvement was noted in NYHA grading of the patients following operative intervention.

CHART 2: VITAL CAPACITY IN PATIENTS WITH MITRAL VALVE DISEASE



DISCUSSION

Mitral stenosis and mitral regurgitation gradually lead to pulmonary venous hypertension which in turn leads to restrictive pattern of respiratory dysfunction[6]. Severity of clinical signs and symptoms depend upon the severity of pulmonary venous hypertension produced by the primary lesion.

Causes of pulmonary hypertension in mitral stenosis are as follows;

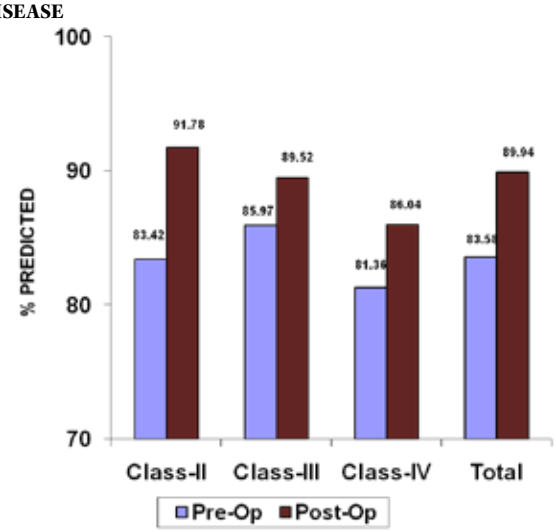
- Passive backward transmission of left atrial pressure.
- Pulmonary arteriolar constriction which is triggered by pulmonary venous hypertension.
- Organic obliterative changes in vascular bed.
- Interstitial edema in the wall of small pulmonary vessels[5,7].

Patients are classified according to the NYHA classification depending upon their clinical status[7].

Most of the patients with symptomatic mitral valve disease develop respiratory dysfunction because of the secondary pulmonary hypertension and severity of respiratory distress correlates with the pulmonary hypertension[8].

However, early surgical intervention in the form of balloon mitral valvotomy or mitral valve repair can largely reverse the changes of pulmonary hypertension thus improve the clinical status of the patients as shown by improvement in their NYHA classification[8,9,10].

CHART 3: FEV1/FVC% IN PATIENTS WITH MITRAL VALVE DISEASE



CONCLUSION

Symptomatic mitral valve disease leads to restrictive type of respiratory dysfunction and timely operative intervention leads to reversal of the clinical picture providing relief to the patients.

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