



## FREQUENCY OF SEVERE MITRAL REGURGITATION AFTER PERCUTANEOUS BALLOON MITRAL VALVOTOMY IN PATIENTS WITH RHEUMATIC MITRAL STENOSIS

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### Author's Contribution

BUAG:Conducted the study and wrote the article. FQ:Helped in review the article. MAK:Re-arranged data and corrected article.TA & BAQ:Tables and figures.MTM and IA were consultants incharge of the study and gave frequent advice, corrections and did the proof reading.

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### ABSTRACT:

**OBJECTIVE:** To calculate the frequency of severe regurgitation of mitral valve after percutaneous balloon mitral valvotomy (BMV) for rheumatic mitral stenosis by using Inoue balloon.

**MATERIAL AND METHODS:**This cross sectional retrospective observational study was performed at Ch. Pervaiz Elahi Institute of Cardiology, Multan. The study was approved by ethics review board, 145 patients of significant Mitral Stenosis were included according to inclusion criteria. The patients included in the study underwent BMV in Angiography Department of above mentioned hospital. After the procedure the patients were observed in the ward. The echocardiography was performed after 24 hrs and presence of noteable mitral regurgitation was assessed.

**RESULTS:** 145 patients were included. Males were 39 (26.9%) and there were 106 (73.1%) females. The mean age of the study population was  $22.30 \pm 5.12$  ranging in between 16 to 36 years. Regarding the length of symptoms, the mean was  $13.25 \pm 7.73$  and ranging in between 6 to 24 months. Left atrial size was  $46.52 \pm 3.83$  mm and range was in between 36 to 52mm. 4 patients (2.75%) developed significant mitral regurgitation. The variables like gender, age, left atrial size and time duration of symptoms did not have any significant effect on outcome. Emergent surgery was not required even in a single patient.

**CONCLUSION:** The frequency of mitral regurgitation after balloon mitral valvotomy is very low and for every pliable mitral valve, balloon valvotomy should be considered.

**KEY WORDS:** Mitral stenosis, Percutaneous transvenous mitral valvotomy.

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## INTRODUCTION

The outflow obstruction to mitral valve is recognized as Mitral stenosis. The major etiology of mitral valve disease is rheumatic fever leading to rheumatic heart disease. RHD most commonly involves mitral valve and 48.6% of patients are reported to have sole stenotic involvement of mitral valve while 51.4% have both stenosis and regurgitation of mitral valve.<sup>1</sup>

Balloon valvotomy of mitral valve (BMV) can be performed as an interventional option for the management of pliable mitral stenosis (MS). The patients benefiting from this procedure is very high and the success of procedure is approximately 97.3%.<sup>2</sup> The success of BMV is labeled when mitral valve area (MVA) increases twice the baseline valve area at the end of procedure and no significant level of mitral regurgitation (MR) is noticed by echocardiography.<sup>3</sup>

For every patient undergoing PTMC, Echocardiographic evaluation should be performed to assess the severity, pliability / mobility, calcification and intravalvular disease of mitral. Echocardiographic evaluation can predict the procedure success and its immediate outcome for example doubling in MV area and presence of consequent mitral regurgitation etc.<sup>4</sup> Although, other studies have shown that anatomy is only a comparative predictor of its outcome.<sup>5</sup> The Wilkins score calculated on Echocardiography can be used to assess and predict the outcome of PTMC.<sup>6</sup>

The development of important mitral regurgitation is a limiting factor for the procedure and it may lead to the emergent replacement of mitral valve. The presence of significant MR is a strong indicator of long term prognosis. In studies, development of less than moderate MR after PTMC shows good survival benefit.<sup>7</sup>

## MATERIAL AND METHODS:

The study was a descriptive, cross-sectional and retrospective, done at CPEIC, Multan and it extended over a period of 6 months. The population of the study was taken by non probability consecutive technique. A total number of 145 patients with significant mitral stenosis (who's valve morphology calculated by Wilkins score on Echocardiography) of both genders were included. Patients with significant regurgitation of mitral and aortic valve with Wilkins score more than eight (assessed on Echocardiography), thrombus in LA (assessed by trans-esophageal echocardiography), MVA more than 1.5 cm and patients with history of previous balloon mitral valvotomy were

not included in the study. BMV was carried out by modified Inoue technique in angiography Lab using Inoue balloon according to the height of the patient. The mean pressure of left atrium was recorded at the start of procedure and then at the completion. Patients were kept in the hospital after the procedure. Next day (after 24hrs) the echocardiography was performed and presence of mitral regurgitation was noted and graded as significant MR and presence of central jet more than 40% of left atrial area was considered as severe MR. The software SPSS version 16 was used to assess the data. Categorical variables of the study and presence of significant MR were denoted as frequency and percentages. Chi-square test was applied on confounding variables. P value of less than 0.05 was labeled as important.

## RESULTS:

Mean of age ( $\pm$ S.D.) was  $22.30 \pm 5.12$  years ranging from 16 to 36 years. There were 39 males (26.9%) and 106 females (73.1%). After BMV, severe MR was 2.8% (4 / 145) in the study group. 1 out of 39 males developed significant MR at the end of procedure and 3 out of 106 females were reported to have significant MR on Echocardiography after the procedure. There was not significant relationship between the gender and outcome of the procedure ( $p=0.707$ ).

## DISCUSSION

The balloon commonly used for BMV in patients with pliable mitral stenosis is Inoue balloon. This is an hour-glass like balloon that helps in good accurate and reliable placement across the stenotic mitral orifice, thereby leading to minimal migration and offers most favorable dilatation. The distinctive structure and dynamic inflation of the balloon gives optimal results. The swift inflation-deflation for approximately five seconds is also suitable and safe for the hemodynamics of the patient. The curative strategy to mitral stenosis has developed since 1984. Inoue et al reported percutaneous balloon mitral valvuloplasty for the first time. Since then, percutaneous BMV has been a popular therapeutic technique for pliable mitral stenosis. The most crucial complications of this procedure is development of severe MR.

Kaul<sup>8</sup> et al has shown in his study done on 3,650 patients with mean age of 26 years; and ranging in between 8-76 years, out of which 910 (24.9%) were less than 15 years of age who underwent PTMC. The MVA was  $0.9 \pm 0.4$  cm<sup>2</sup> (ranging: 0.3-1.3 cm<sup>2</sup>); 1396 cases (38.2%) did not show any significant mitral regurgitation, moderate in



394 (10.8%) and severe in 22 (0.6%). The PTMC was considered lucrative in 3,276 (89.8%), with mitral valve area of  $1.7 \pm 0.6$  cm<sup>2</sup> (range: 1.4-2.6 cm<sup>2</sup>) at the end of procedure, and there was no significant complication after the procedure. More than moderate MR was present in 120 patients (3.3%), out of which 66 (1.8%) needed early surgical treatment. Leaflet rupture was present in 48 (72.7%) while rupture of chordae was present in 12 (18.2%) and tear of commissures was noticed in 6 (9.1%). The patients who followed up after the procedure were 49 (1.3%); 30 (0.8%) needed MVR and 19 (0.5%) were in functional class II (NYHA) at a mean follow up of two years. MR 2--3+ was present in 188 cases (5.1%), with tear of commissures as principal cause in 120 (63.8%), rupture of chordae in 68 (36.2%). MR deteriorated in 30 cases (0.8%) out of whom 20 (0.6%) patients needed elective replacement of mitral valve. Mitral regurgitation declined in 58 patients (1.6%), in whom tear of commissure was the major cause.

Momtahn et al<sup>9</sup> conducted his study on patients who underwent valvuloplasty of Mitral valve and closed mitral valve commissurotomy, 450 and 127 patients, respectively. Immediately after BMV, mean pressure of LA was  $11.38 \pm 3.54$  mmHg, gradient across mitral valve was  $1.8 \pm 2$  mmHg, and MVA was  $2.04 \pm 0.04$  cm<sup>2</sup> (all  $p < 0.0001$ ).

Follow up after seven days of surgical treatment, gradient across mitral valve was  $6.04 \pm 2.04$  mmHg and MVA was  $1.85 \pm 0.45$  cm<sup>2</sup>. The presence of severe mitral regurgitation was noted in two patients in each group. One mortality was reported due to infection in patients undergoing surgery. Less than moderate MR was present in 36 patients (28.3%) in the patients undergoing surgery while 11 patients (8.7%) had only mild MR in the BMV group. The rate of success was 96.8% in each group. He deduced that the results in both the groups were comparable and BMV can safely be performed for patients with pliable MS.

The observations of this study are in accordance with different studies conducted worldwide which have shown the frequency of severe MR in between 2-19%. The variables like gender, age, left atrial size and time duration of symptoms did not have any major effect on outcome. This observational study should be conducted over a large population to increase the reliability of results. It is recommended to use newer Echocardiographic techniques like 3D evaluation of mitral valve which can further improve the assessment of mitral valve before performing BMV.

#### CONCLUSION:

The frequency of regurgitation of mitral valve after balloon valvotomy is very low and for every pliable mitral valve balloon valvotomy should be considered.

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