



## STUDY ON ASSESSMENT OF RIGHT VENTRICLE FUNCTION - PRE & POST PTMC IN SEVERE MITRAL STENOSIS PATIENTS

<b>Dr. G. S. Sivakumar MD DM</b>	Assistant Professor, Department Of Cardiology, Government Rajaji Hospital, Madurai.
<b>Dr. M. Ilamaram MD*</b>	Post Graduate, Department Of Cardiology, Government Rajaji Hospital, Madurai. *Corresponding Author
<b>Dr. S. Balasubramanian MD DM</b>	Professor & HOD, Department Of Cardiology, Government Rajaji Hospital, Madurai.
<b>Dr. G. Selvarani MD DM</b>	Associate Professor, Department Of Cardiology, Government Rajaji Hospital, Madurai.

**ABSTRACT** **Background:** Right ventricular (RV) function plays an important role in the development of clinical symptoms and the overall prognosis of patients with mitral stenosis. It is predominantly affected through hemodynamic changes due to pulmonary vascular alterations. The right ventricular function is an important determinant of exercise capacity, survival and postoperative outcome in patients with mitral stenosis. **Objective** The purpose of this research paper was to assess the immediate and short term effect of PTMC on RV function using two dimensional and doppler echocardiographic indices and also to assess the RV function in patients who undergo PTMC for isolated severe mitral stenosis before, after and at 6 months cohort follow up after PTMC. It was Prospective study conducted in Govt Rajaji Hospital in 1 year 2021-2022

### Dimensional(2D) Echo – RV assessment

- RV dimensions -Basal diameter, Midcavity diameter, RV longitudinal diameter, RVOT diameter, RV free wall thickness, RV Fractional Area change = (End diastolic area – End systolic area) \* 100/ End diastolic area, RV Tricuspid annular plane systolic excursion

### Doppler Measurement- RV assessment

- RV systolic pressure assesment from Tricuspid regurgitation jet velocity in Continuous Doppler . RVSP = (Trjet Vmax)<sup>2</sup> + RAP
- DTI (doppler tissue imaging) – derived triupid lateral annulus systolic velocity – S'
- RV MPI = (TCO – RVET)/RVET. TCO – tricuspid valve opening to closure time, RVET- Right ventricular ejection time

**RV Global Longitudinal Strain (GLS):** Imaging acquired by inverting the A4C GLS routinely used for left ventricle GLS measurement

**Inclusion criteria:** Age >18 yrs, Severe mitral Stenosis, Sinus rhythm **Exclusion criteria:** Patients with Atrial Fibrillation, Pregnancy heart disease, Class IV NYHA symptom, Chronic obstructive pulmonary disease patients **Results:** Total 40 patients were studied. Of total 40 patients 30 were females (75%), of which 8 were antenatal patients, 10 males (25%). In the immediate post operative period 35 patients had significant decrease in pulmonary hypertension i.e 87.5% (p value  $\leq 0.001$ ), 22 patients showed improvement in RV GLS (55%) (p value  $\leq 0.001$ ), 18 patients had improved RVFAC (45%) (p value  $\leq 0.001$ ), 8 patients showed improved RVMPI (20%), 2 patients had increased TAPSE (5%), 1 patient had increased S' (2.5%). 3 patients each showed moderate to severe Mitral regurgitation, no decrease in MVO and no decrease in mean Left atrial Pressure. In the 6 month follow up period 35 patients showed improved pulmonary hypertension, (87.5%) (p value  $\leq 0.001$ ) 25 patients with improved RVGLS (61.29%) (p value  $\leq 0.001$ ), and 20 patients had improved RVFAC (62.5%) (p value  $\leq 0.001$ ) parameter. There was no significant change in RV dimensions in immediate post operative or 6 months follow up. **Conclusion:** The results of the study shows there is significant improvement in pulmonary hypertension, RVGLS, RVFAC in the immediate post operative period and also during the 6 months follow up. This improvement in right ventricle function parameters improves the functional capacity, survival and successful postoperative outcome in patients with severe Mitral stenosis undergoing BMV.

## KEYWORDS :

### INTRODUCTION

Right ventricular (RV) function plays an important role in the development of clinical symptoms and the overall prognosis of patients with mitral stenosis [2–4]. It is predominantly affected through hemodynamic changes due to pulmonary vascular alterations. The important determinant of exercise capacity, survival and postoperative outcome in patients with mitral stenosis is right ventricular function[4]. Endocardial surface is irregular, acoustic window is narrow for assessing the right ventricular function. Hence conventional echocardiography cannot evaluate RV function reliably[5]. Functional capacity, symptoms, need for intervention and timing it, the perioperative mortality, morbidity and postoperative outcome of severe mitral stenosis depend on Right ventricular compliance[6.] The pulmonary hypertension in mild stage of Mitral Stenosis is primarily reactive, it is reversible, severe long duration of MS results in obliterative fixed constriction of the pulmonary arterioles. This results in notable right ventricular dysfunction and also significant pressure overload to right ventricle[7]. Hence Right ventricular dysfunction is an important marker towards the evaluation of severity in Mitral Stenosis. Radio nuclide ventriculography, cardiac catheterization; cardiac magnetic resonance imaging (MRI) and 3-dimensional echocardiography could be used for the assessment of RV

function. However, these methods are time consuming, costly and not widely available.

### OBJECTIVE

The purpose of this research paper was to assess the immediate and short term effect of PTMC on RV function using two dimensional and doppler echocardiographic indices, right ventricle global longitudinal strain and also to assess the RV function in patients who undergo PTMC for isolated severe mitral stenosis before, after and at 6 months cohort follow up after PTMC.

### MATERIALS AND METHODS:

**Study Design:** Prospective analytical study conducted in Govt Rajaji Hospital.

**Sample Size:** 40

**Period Of Study:** APRIL 2021 TO MARCH 2022

**Inclusion criteria:** Age >18 yrs, Severe mitral Stenosis, Sinus rhythm

**Exclusion criteria:** Patients with Atrial Fibrillation, Pregnancy

complicated by heart disease ,Class IV NYHA symptom,Chronic obstructive pulmonary disease patients

**Data Collection:**

**Dimensional(2D) Echo – RV assessment**

- RV dimensions -Basal diameter, Midcavity diameter, RV longitudinal diameter, RVOT diameter, RV free wall thickness, RV Fractional Area change =(End diastolic area –End systolic area) \* 100/ End diastolic area, RV Tricuspid annular plane systolic excursion

**Doppler Measurement- RV assessment**

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**RV Global Longitudinal Strain (GLS):** Imaging acquired by inverting the A4C GLS routinely used for left ventricle GLS measurement

**Colloboration Departments :**

DEPARTMENT OF CARDIOLOGY , GOVT RAJAJI HOSPITAL, MADURAI

**Ethical Clearance:** Obtained from Institute Ethical Committee

**Consent:** Individual written and informed consent obtained

**ANALYSIS: STATISTICAL ANALYSIS**

The information collected regarding all selected cases were recorded in master chart. Data analysis was done with the help of computer by using SPSS 26 software and sigma stat version 3.5 (2012). Using this software mean, standard deviation, and p'value were calculated through Student 't' test. One way ANOVA,Chi square test and correlation coefficient from Pearson correlation and p value <.05 is taken as significant.

**Conflict Of Interest:** NIL

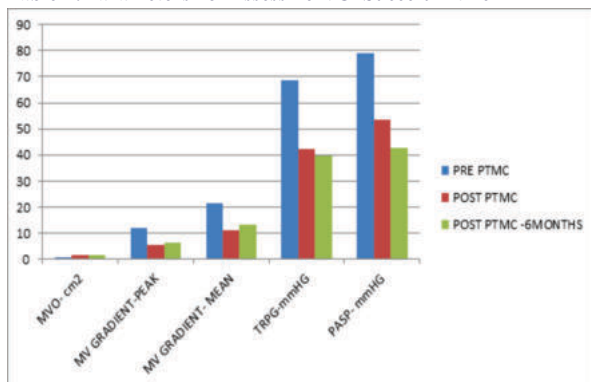
**Financial Support :** NIL

**RESULTS :**

**Table 1: Baseline Characteristics Of Cases**

SL NO	VARIABLES	MEAN +- SD	P value
1	Age	35.05±0.8	≤0.001
2	Sex	F-30(75%) M-10(25%)	≤0.001
3	NYHA class	II – 22 (55%) III- 18 (45%)	≤0.001
4	Duration of symptoms	8.45±4.63	≤0.001
5	LAE on ecg	32(80%)	≤0.001

**Table 2 : Parameters For Assessment Of Successful Ptmc**

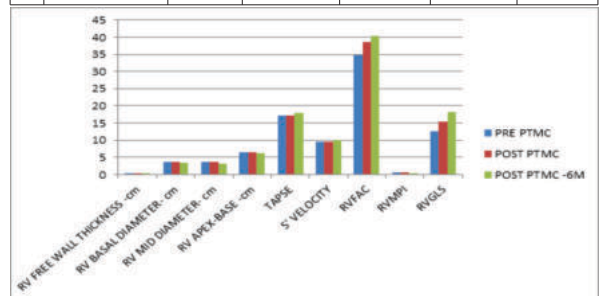


Sl no	Parameters	Pre PTMC	Post PTMC	Post PTMC 6 months	p- value pre PTMC vs post PTMC	p- value pre PTMC vs 6 months post PTMC
1	MVO –cm2	0.9±0.17	1.64 ± 0.13	1.54 ± 0.11	≤0.001	≤0.001

2	MV gradient in mmhg (mean )	12 ± 6	5.3± 1.6	6.4 ± 1.8	≤0.001	≤0.001
3	MV gradient ( peak) mm hg	21.5 ± 5.2	11.2 ± 3.54	13.3 ± 4.3	≤0.001	≤0.001
4	TR PG	68.5 ± 20.36	42.32 ± 15.34	39.58 ± 16.30	≤0.001	≤0.001
5	PASP	78.96± 23.62	53.32± 15.12	42.86 ± 17.72	≤0.001	≤0.001

**Table3: RvFunction Assessment-2d/ Doppler/gls**

Sl no	Parameters	Pre PTMC	Post PTMC	Post PTMC at 6 months	p-value Pre PTMC vs Post PTMC	p-value pre ptmc vs post PTMC 6months
1	RV Free wall thickness(cm)	0.47±0.12	0.47±0.14	0.45±0.08	0.35	0.38
2	RV dimensions(cm) Base	3.65±0.89	3.65±0.96	3.45±0.75	0.51	0.54
3	Mid	3.65±0.74	3.65±0.84	3.25±0.54	0.29	0.30
4	Apex to Base	6.51±0.86	6.51±0.86	6.20±0.65	0.38	0.36
5	RV FAC%	34.74± 8.75	38.55±9.5	40.47±10.65	≤0.001	≤0.001
6	TAPSE(mm)	17.06± 3.25	17.06±3.25	18±3.13	0.28	0.26
7	MPI	0.59±0.05	0.50±0.08	0.48±0.11	≤0.001	≤0.001
8	S velocity at annulus	9.61±0.80	9.61±0.80	10.03±0.75	0.29	0.30
9	RV GLS	12.56± 4.33	15.35±4.73	18.27±4.96	≤0.001	≤0.001



**Table4: Cardiac Catheterisation Data**

Cardiac Catheterization Data	Pre PTMC	Post PTMC	p-value
Mean LA pressure (mmHg)	25.75±7.50	13.55± 3.60	≤0.001
PA systolic pressure (mmHg)	75.14±35.65	40.14± 16.55	≤0.001

**Interpretation Of Data:**

Total 40 patients were studied. Of total 40 patients 30 were females ( 75%), of which 8 were antenatal patients, 10 males (25%). In the immediate post operative period 35 patients had significant decrease in pulmonary hypertension i.e 87.5%(p value ≤0.001), 22 patients showed improvement in RV GLS (55%)(p value ≤0.001), 18 patients had improved RVFAC (45%)(p value ≤0.001), 8 patients showed improved RVMPI (20%), 2 patients had increased TAPSE (5%), 1 patient had increased S' (2.5%).3 patients each showed moderate to severe Mitral regurgitation, no decrease in MVO and no decrease in mean Left atrial Pressure. In the 6 month follow up period 35 patients showed improved pulmonary hypertension ,(87.5%)(p value ≤0.001) 25 patients with improved RVGLS (61.29%)(p value ≤0.001), and 20 patients had improved RVFAC( 62.5%) (p value ≤0.001) parameter. There was no significant change in RV dimensions in immediate post operative or 6 months follow up

**CONCLUSION :**

The results of the study shows there is significant improvement in pulmonary hypertension, Right Ventricle GLS , Right Ventricle FAC in the immediate post operative period and also during the 6 months follow up. This improvement in right ventricle function parameters improves the functional capacity, survival and successful

postoperative outcome in patients with severe Mitral stenosis undergoing BMV.

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