

*Research Article***Left atrial Deformation Parameters in Patients with Moderate to Severe Mitral Stenosis****Alaa M. I, Sayed, S. M and Sherif S.S**

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**Abstract**

**Objectives:** to assess the left atrial deformation parameters in patients with moderate to severe mitral stenosis by transthoracic echocardiography. **Methodology:** this study was conducted on 30 patients with moderate to severe mitral stenosis presented to Cardiovascular Department in Minia University Hospital from 1/11/2018 to 30/10/2019, Left atrial (LA) volume parameters (maximum, minimum and pre atrial contraction) were measured. **Results:** 25 patients (83.5%) in this study had increased maximal left atrial volume (>34 ml indexed to body surface area) and 5 patients (16.7%) had normal maximal volume (<34ml/BSA) with median LA MAX volume (61.5 ml/BSA) and for minimal left atrial volume 26 patients (86.7%) had increased minimal left atrial volume (>14 ml/BSA) and 4 patients (13.3%) had normal minimal LA volume (<14 ml/BSA). **Conclusion:** left atrial deformation parameters were impaired in patients with moderate to severe mitral stenosis detected by transthoracic echocardiography.

**Key words:** left atrial function, mitral stenosis, transthoracic echocardiography.

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**Introduction**

Although the incidence of mitral stenosis (MS) has decreased in developed countries, MS still results in significant morbidity and mortality worldwide<sup>[1]</sup>. Proper atrial function plays an important role in determining atrial pressure and in maintaining blood flow across the stenotic valve<sup>[2]</sup>. Left atrial (LA) inflammation, fibrosis, and remodeling due to rheumatic carditis, associated with pressure overload because of mitral stenosis, lead to low blood flow state and thrombosis formation<sup>[3]</sup>. Echocardiography is the widely used method for detecting left atrial and left atrial appendage thrombi<sup>[4]</sup>. The aim of this study is to assess the left atrial deformation parameters in patients with moderate to severe mitral stenosis by transthoracic echocardiography.

**Methodology**

This study was conducted on 30 patients with moderate to severe mitral stenosis presented to Cardiovascular Department in Minia University Hospital from 1/11/2018 to 30/10/2019. Exclusion criteria: we excluded patients with atrial fibrillation, history of paroxysmal AF and or stroke, under treatment with warfarin, more than moderate mitral regurgitation, left

ventricular ejection fraction (LVEF) <50%, bundle branch block, history of hypertension, coronary artery disease, diabetes mellitus, and symptomatic patients with New York Heart Association functional class III or IV.

**Transthoracic echocardiography**

Left atrial (LA) volume parameters (maximum, minimum and pre atrial contraction) were measured using transthoracic echocardiography. All patients were studied in the left lateral decubitus position using an ultrasound system (Siemens acuson SC2000) using a "4V1" transducer. Standard two dimensional and M-mode measurements were obtained in the apical 4 and 2 chambers and left parasternal views according to the American society of echocardiography guidelines<sup>[5]</sup>.

**Results**

25 patients (83.5%) in this study had increased maximal left atrial volume (>34 ml indexed to body surface area) and 5 patients (16.7%) had normal maximal volume (<34ml/BSA) with median LA MAX volume (61.5 ml/BSA) and for minimal left atrial volume 26 patients (86.7%) had increased minimal left atrial volume (>14 ml/BSA) and 4 patients (13.3%) had normal minimal LA volume (<14 ml/BSA).

All the patients had dilated left atrium with LA dimension range from (4.1 to 6.8 cm) with mean  $\pm$  SD  $4.9\pm 0.6$  cm. All the patients had normal LV diastolic internal dimension with range (3.7-5.1 cm) and Mean  $\pm$  SD  $4.5\pm 0.3$  cm. All the patients had normal LV systolic internal dimension with range (2.5-3.8 cm) and Mean  $\pm$  SD  $3.2\pm 0.3$  cm. All the patients had normal LV

ejection fraction with range (54-71%) and Mean  $\pm$  SD  $61.2\pm 4.5\%$ . 28 patients (93.3%) had severe MS with Mitral valve area  $<1.5$  cm<sup>2</sup> and 2 patients (6.6%) had moderate MS (MVA  $>1.5$  cm<sup>2</sup>) with median MVA (1.2 cm<sup>2</sup>). All the patients had elevated pulmonary artery systolic pressure range from (35-75 mmhg) and Mean  $\pm$  SD  $46.3\pm 9.1$  mmhg as shown in (table 1).

**Table (1):** 2D Transthoracic echocardiography parameters:

		<b>Descriptive statistics N=30</b>
<b>MAX LA VOL</b>	<b>Median IQR</b>	61.5 (43.3-80.5)
<b>Max LA Vol</b>	<b>&lt;34 ≥34</b>	5(16.7%) 25(83.3%)
<b>MIN LA VOL</b>	<b>Median IQR</b>	31.5 (19.8-58.8)
<b>Min LA Vol</b>	<b>&lt;14 ≥14</b>	4(13.3%) 26(86.7%)
<b>LA PRE A VOL</b>	<b>Median IQR</b>	42 (31-66)
<b>LA SV</b>	<b>Median IQR</b>	24 (18-31.3)
<b>LA EF</b>	<b>Median IQR</b>	46 (30-55.3)
<b>LA EI</b>	<b>Median IQR</b>	87 (43-124.8)
<b>LA AEF</b>	<b>Median IQR</b>	24.5 (13-37.8)
<b>LA PEF</b>	<b>Median IQR</b>	26 (13-37)

## Discussion

Our current study revealed that left atrial parameters were impaired in patients with moderate to severe mitral stenosis.

As the target organ affected by MS, LA remodeling occurs early. Increased LA pressure within the LA myocardium may lead to progressive intrinsic LA dysfunction. But in the early stage, the initial rise in LA contribution to LV filling may represent a compensatory response to the diminution of the rapid early component of LV filling, resulting in an elevated left atrial filling component<sup>[6]</sup>.

In previous studies, atrial myocardial deformation properties, as assessed by deformation

imaging, are abnormal even in asymptomatic patients with rheumatic MS<sup>[7, 8]</sup>.

## Conclusion

Left atrial deformation parameters were impaired in patients with moderate to severe mitral stenosis detected by transthoracic echocardiography.

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