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# FREQUENCY OF EARLY LEFT VENTRICULAR REMODELING AMONG THE PATIENTS WITH SEVERE AORTIC REGURGITATION AFTER THE REPLACEMENT OF AORTIC VALVE

**[1]Dr Farhat Ullah Khan, [1]Dr Farhana Rashid, [2]Dr Waqas Azam**

[1]Lady Reading Hospital, Peshawar

[2]Mohi-Ud-Din Islamic Medical College, Mirpur A.K

**Abstract:**

***Objectives:*** *The aim of this research work is to assess the rate of occurrence of early remodeling among patients of severe aortic regurgitation after the replacement of the aortic valve and to determine the prevalence of the in time remodeling among the patients having stroke volume of greater than 97.0 ml versus less than 97.0 ml before the replacement of aortic valve.*

***Methodology:*** *The design of this study was comparative study and the duration of this study was from July 2017 to November 2018 conducted in Lady Reading Hospital, Peshawar. There were total 57 patients with aortic regurgitation were the part of this research work. SPSS V.23 was in use for the statistical analysis of the collected information. T test was in use for the analysis of the different continuous variables and analysis of the qualitative variables carried out with the use of the Chi square test.*

***Results:*** *Among total 57 patients, early remodeling occurred in 59.6% (n: 34) patients after the surgical intervention. The average pre-surgical volume of stroke of the patient in whom there was occurrence of remodeling was 110.30 ± 9.66 ml whereas average pre-surgical volume of stroke of the patients who did not have to undergo remodeling was 86.650 ± 7.63 ml. Total 82.40% (n: 28) patients were present with the stroke volume of greater than 97.0 ml in whom there was occurrence of remodeling while among the patients present with stroke volume of less than 97.0 ml, there was occurrence of remodeling in only 17.60% (n: 6) patients. There was not a single mortality in the hospital.*

***Conclusion:*** *There is a strong relationship between the stroke volume and early remodeling of the left ventricular after the replacement of the aortic valve. The stroke volume greater than 97.0 ml is suitable predictor for the early remodeling of left ventricular.*

***KEYWORDS:*** *Left Ventricular, Aortic Valve, Remodeling, Replacement, Regurgitation, Mortality, Pre-Surgical.*

**Corresponding author:**

**Dr. Farhat Ullah Khan,**

*Lady Reading Hospital, Peshawar*

QR code

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## INTRODUCTION:

Aortic Regurgitation is the blood reflux from the aorta into left ventricle in the duration of diastolic function due to no co-optation of the leaflets of aortic valve during the diastole. Pure chronic AR is not much common disease. But it can result in both the overloaded conditions of volume and pressure. In the very early stage, dilatation of the Left Ventricular and hypertrophy occur to recompense the overload of volume and to maintain the function of the left ventricular as normal. But there is relationship of the progressive LV dilatation with the higher threats of symptoms of dysfunction of left ventricle and sudden mortality after the surgical intervention. Surgery of the replacement of aortic valve is advised only for the symptomatic patients suffering from the chronic aortic regurgitation. There was improvement in symptoms in majority of the patients after the surgical intervention; some remaining patients developed post-surgical failure of heart as well as death.

Left Ventricular End Diastolic Dimension and systolic function are the vital factors for the aortic valve replacement AVR timing. No cut-off left ventricular end diastolic dimension value is available that can be utilized as surgery indicator. Ejection Fraction of left ventricle remained as the widely researched to identify post-operative dysfunction of left ventricular but there is no association of the pre-operative dysfunction with the post-operative Ejection Fraction. But one research work discovered that pre-operative EF can be a predictor of the complete recovery after the successful recovery after replacement of aortic valve. Some researchers have discovered that that pre-operative stroke volume of greater than 97.0 ml is suitable predictor of post-surgical remodeling of Left Ventricular as well as better outcomes.

## METHODOLOGY:

The design of this study was comparative study and the duration of this study was from July 2017 to November 2018 conducted in Lady Reading Hospital, Peshawar. Total 57 patients suffering from chronic Aortic Regurgitation who were undergoing the replacement of aortic valve were the part of this research work. Patients present with the acute Aortic Regurgitation, having more co-morbidities as diseases of coronary artery, diseases of mitral valve and aortic stenosis were not the part of this research work. Ethical committee of the hospital gave the permission to conduct this research work. We took the consent of the patients after explaining them the purpose of the research work. We collected the information about the left ventricular end diastolic dimension before surgery, Ejection Fraction of left ventricle and stroke volume from the ECG reports of the patients. We calculated the stroke volume of all the patients by calculating the diameter of outflow tract in view of para-sternal long axis at the base of the leaflet of aortic valve by a specialist cardiologist.
After complete seven days of surgery, a specialist cardiologist carried out the Post-surgical calculations of left ventricular end diastolic dimension among patients. we took the reduction in left ventricular end diastolic dimension as significant, if this reduction was equal to or greater than 10.0% of its value of base line. We divided the patients into two groups depending upon the remodeling. SPSS V.23 was in use for the statistical analysis of the collected information. Measurement of the continuous variables carried out with the help of T test and Chi Square test was in use for the measurement of the qualitative variables.

## RESULTS:

A sum of total 57 patients present with the chronic aortic regurgitation of severe nature who underwent the replacement of the aortic valve were the part of this research work. All the patients were present with their reports of echocardiography assessment 7 days before the surgical intervention and in early post-surgical period as seven days after the surgical intervention. Calculations included the volume of the stroke and end diastolic diameter of left diameter. There was occurrence of remodeling in 59.64% (n: 34) patients after the surgical intervention.

**Table-I: Comparison Of Baseline And Echocardiographic Characteristics**

| Variables | (Patients with Early Remodeling) | (Patients Without Early Remodeling) | P-Value |
|---|---|---|---|
| | Mean ± SD | Mean ± SD | |
| Number of Patients | 34.0 ± 59.65 | 23.0 ± 40.35 | |
| Age (Y) | 41.41 ± 14.2 | 39.22 ± 13.64 | 0.5500 |
| Male Gender (%) | 24.0 ± 70.58 | 13.0 ± 56.52 | 0.1900 |
| BMI (kg/m$^2$) | 24.8 ± 4.47 | 23.04 ± 4.47 | 0.1500 |
| Diabetic History (%) | 3.0 ± 8.6 | 2.0 ± 9.1 | 0.9400 |
| Hypertension History (%) | 8.0 ± 22.9 | 3.0 ± 13.6 | 0.3900 |
| Pre-op Stroke Volume (ml) | 110.38 ± 9.66 | 86.65 ± 7.63 | <0.0010 |
| Pre-op LEFT Ventricular End Diastolic Dimension (mm) | 64.91 ± 9.02 | 69.92 ± 8.6 | 0.0400 |
| Post-op Left Ventricular End Diastolic Dimension (mm) | 57.72 ± 8.46 | 68.57 ± 9.08 | <0.0010 |
| Left Ventricular Ejection Fraction | 56.32 ± 8.9 | 55.81 ± 10.62 | 0.8500 |

The average age in the group of early remodeling was 41.410 ± 14.20 years whereas 39.20 ± 13.60 years in the patients who were present with no remodeling. Left Ventricular End Diastolic Dimensions of the patients present with remodeling were 64.910 ± 9.020 and in the patients with no remodeling were 69.92 ± 8.6. The average pre-surgical stroke volume of patient present with remodeling was 110.30 ± 9.66 ml vs 86.650 ± 7.630 ml in the patients with no remodeling. There were total 82.40% (n: 28) patients with the stroke volume of equal and greater 97.0 ml in whom there was occurrence of remodeling whereas among patients with the stroke volume less than 97.0 ml, there was occurrence of remodeling in only 17.60% (n: 6) patients. There was no mortality in the hospital.

**Table-II: Stroke Volume And Its Relationship With Remodeling**

| Category of Stroke Volume | Patients with Remodeling | | Patients without Remodeling | | P-Value |
|---|---|---|---|---|---|
| | No | Percentage | No | Percentage | |
| S.V > 97 ml | 28.0 | 82.40 | 9.0 | 39.10 | 0.0040 |
| S.V < 97 ml | 6.0 | 17.60 | 14.0 | 60.90 | |

**Table-III: Comparison of Pro-Op and Post-Op Left Ventricular End Diastolic Dimension**

| Remodeling Status | Pre-op Left Ventricular End Diastolic Dimension | Post-op Left Ventricular End Diastolic Dimension | P-value |
|---|---|---|---|
| | Mean ± SD | Mean ± SD | |
| Patients with Remodeling | 64.91 ± 9.02 | 57.72 ± 8.46 | <0.0010 |
| Patients without Remodeling | 69.92 ± 8.60 | 68.57 ± 9.08 | 0.4700 |

## DISCUSSION:

There are many controversies about the suitable timing for the replacement of AV among patients suffering from Aortic Regurgitation of severe nature. The current guidelines of ACC/AHA for the AVR do not allow the surgical intervention among patients of the severe Aortic Regurgitation present with EF less than 50.0%, left ventricular end diastolic dimension greater than 70.0 mm and LVESD greater than 50.0 mm. Turk performed the surgery of the patients present with these all three features and discovered that replacement of the AV in these patients has association with significant rate of survival. In accordance to the survey of Euro, only 32.0% patients present with left ventricular ejection fraction less than 50.0% to 30.0% underwent AV replacement

and only 3.0% patients with left ventricular ejection fraction less than 30.0%. Pressure and volume overload occur concurrently in the patients of chronic Aortic Regurgitation of severe nature so, left ventricular end diastolic dimension can be used for the examination of the seriousness of volume overload. After the replacement of AVR, there can be reduction in the left ventricular end diastolic dimension within some days after the surgery, causing decrease in preload and a transient reduction of the left ventricular ejection fraction. Some research works discovered the association availability of viable myocardium and SV with extent among patients suffering from systolic dysfunction of left ventricle.

The standard reference used for the estimation of the contractibility of the left ventricle is dB/dt. This has a strong association with the post-operative Ejection Fraction. In Accordance to the Gold, there is significant association between the maximum dB/dt and the stroke volume. Some other research works have concluded that there was association between the other variables of functionality of Left Ventricular and SV. These research works also concluded that various variations in the SV with the infusion of dobutamine have association with the remodeling of Left Ventricular and they have a potential to assess the operative outcomes. These research works showed that there is a strong linear association myocardial viability, stroke volume and contractility reserves. In this research work, we assessed that there is a strong association between the early remodeling of left ventricle after AVR and stroke volume and the stroke volume of greater than 97.0 ml is very suitable predictor to prevent delayed remodeling.

## CONCLUSION:

There is a strong association between the early remodeling of left ventricular and stroke volume after the replacement of the aortic valve. The stroke volume with greater than 97.0 ml is very suitable predictor of the early remodeling of the left ventricular.

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