



## A PROSPECTIVE OBSERVATIONAL STUDY ON ASSESSMENT OF LEFT VENTRICULAR FUNCTION USING BIPLANE AND SPECKLE TRACKING ECHOCARDIOGRAPHY IN PRIMARY PCI PATIENTS

### Cardiology

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### ABSTRACT

**Introduction :** In Acute Coronary Syndrome, High risk Unstable angina, ST Elevated Myocardial Infarction and Non-ST Elevated Myocardial Infarction leads to worse prognosis of patient's myocardium. Once the onset of symptoms of ACS is noticed on patient, he /she should be diagnosed earlier, and subsequent ECG should be taken, and patient should be received to nearby hospital within Door to balloon or Door to needle time. The Primary Angioplasty was done in such patients. This procedure prevents the further death of myocardial tissue caused by plaque lesion. The Left Ventricular Function was also significantly improved in these patients. The assessment of LV Function was evaluated by various echocardiographic techniques. The quantitative assessment of LV Function was more promising by Simpson and Speckle tracking echocardiographic method. **Aim And Objective: Aim :** A prospective observational study on assessment of LV function using Biplane and Speckle tracking echocardiography in Primary PCI patients. **Objective:** To assess the LV systolic function using Biplane Simpson's method and Speckle tracking echocardiography in Primary angioplasty patients. **Patients And Methods:** Between the months January 2024 to October 2024, a total of 60 consecutive patients were a known case of Diabetes Mellitus, Systemic Hypertension, Dyslipidemia and Hypothyroidism. All these patients presented to Cardiac OPD, Emergency department with complaints of chest pain and diagnosed as Acute Coronary Syndrome. With the concern of patient and their bystanders they underwent Primary Angioplasty. Those patients were prospectively reviewed for improvement in LV function using Biplane Simpson's and Speckle tracking echocardiography. **Conclusion :** Tissue Mitral Annular Displacement was significantly correlated with other systolic function parameters like Simpson derived Ejection Fraction and Global Longitudinal Strain %. Hence, Tissue Mitral Annular Displacement might also be used as Left Ventricular systolic function assessing Echocardiographic marker and it was less time consuming.

### KEYWORDS

#### INTRODUCTION:

Coronary Artery Disease is a major cardiac issue in the current population. The main etiological factors for the causing of CAD are Diabetes Mellitus, Systemic Hypertension, Dyslipidemia, Hypothyroidism, Stress, Alcohol consumption and smoking. These risk factors cause endothelial injury in Coronary arteries, and it leads to production of free radicals. This interaction leads to activation of immune system and causes aggregation of lymphocytes and LDL. Finally, complete plaque formation has happened. This plaque formation leads to decreased blood flow to the Coronary arteries and causing myocardial ischemia and subsequently leads to Acute Coronary Syndrome.

In Acute Coronary Syndrome, High risk Unstable angina, ST Elevated Myocardial Infarction and Non-ST Elevated Myocardial Infarction leads to worse prognosis of patient's myocardium. Once the onset of symptoms of ACS is noticed on patient, he /she should be diagnosed earlier, and subsequent ECG should be taken, and patient should be received to nearby hospital within Door to balloon or Door to needle time.

The Primary Angioplasty was done in such patients. This procedure prevents the further death of myocardial tissue caused by plaque lesion. The Left Ventricular Function was also significantly improved in these patients.

The assessment of LV Function was evaluated by various echocardiographic techniques. The quantitative assessment of LV Function was more promising by Simpson and Speckle tracking echocardiographic method.

#### Aim And Objective

##### Aim :

A prospective observational study on assessment of LV function using Biplane and Speckle tracking echocardiography in Primary PCI patients.

##### Objective:

To assess the LV systolic function using Biplane Simpson's method and Speckle tracking echocardiography in Primary angioplasty patients.

#### MATERIALS AND METHODS:

##### Study Design and Setting:

This was a prospective observational study conducted at the Department of Cardiology, Chettinad Super Speciality Hospital,

Kelambakkam, Chennai. The study was performed over a Ten-month period, from January 2024 to October 2024, following institutional ethical approval.

##### Ethical Clearance:

The study protocol was reviewed and approved by the Institutional Human Ethics Committee. Written informed consent was obtained from all participants prior to their inclusion in the study.

##### Study Population:

a total of 60 consecutive patients were a known case of Type 2 Diabetes mellitus, Systemic hypertension, Dyslipidaemia and Hypothyroidism. All these patients presented to Cardiac OPD, Emergency department with complaints of chest pain and diagnosed as Acute Coronary Syndrome. With the concern of patient and their bystanders they underwent Primary Angioplasty. Those patients were prospectively reviewed for improvement in Left Ventricular function in Chettinad Super Speciality Hospital (Cardiac OPD – Echo room), Kelambakkam.

##### Inclusion Criteria:

**Patients Were Eligible For Inclusion If They Met The Following Criteria:**

- Age limit 40 to 70 years.
- DM, SHTN, DLP, Hypothyroidism
- Patients with family history of CAD.

##### Exclusion Criteria:

**Patients Were Excluded If They Had Any Of The Following:**

- Arrhythmias.
- Pregnancy.
- Patients with psychiatric issues.

##### Data Collection And Echocardiographic Assessment:

Using conventional echocardiography ECG gated Two Dimensional, M-mode, speckle tracking technique will be done using the Philips affinity 50C machine in Department of Cardiology.

The Standard Parasternal Long axis, Parasternal short axis, Apical 4 chamber, Apical 2 chamber, Apical 3 chamber, Sub costal views will be recorded.

In echocardiography, the Left Ventricular systolic function assessed by three echo techniques.

- Biplane Simpson's method
- Global Longitudinal strain
- Tissue mitral annular displacement

RESULTS & DISCUSSION:

In this study, 60 patients were taken in which 40 patients were male (67%) and 20 patients were female (33%) who undergone Primary angioplasty in Chettinad Super Speciality Hospital were included.

In 60 patients, with average age group of 40 to 70 years, 50% patients were within the average group of 40 to 50 years, 27% patients were within the age group of 50 to 60 years, and 23% patients were within the age group of 60 – 70 years. Among 60 patients, 20 patients had a known comorbidity of Type II Diabetes Mellitus (33%), 24 patients with Systemic Hypertension (40%), 10 patients with Dyslipidemia (16%) and 6 patients with Hypothyroidism (10%) have developed Acute Coronary Syndrome. (Table 1)

The Left ventricular systolic function was assessed using various echocardiographic techniques. From Simpson's method the mean value of End Diastolic volume of 69.06 ml and End Systolic volume of 27.66 ml was calculated.

From Global Longitudinal strain method, the mean value of LV AP2 strain of -14.1%, mean value of LV AP3 strain of -13.1%, mean value of LVAP4 strain -14.0% was calculated.

From Tissue Mitral Annular Displacement method, the mean value of septal (MVs) of 8.4mm, mean value of lateral (MV l) of 8.0mm and mean value of Midpoint (MV m) of 7.8mm.

The Correlation Coefficient was calculated between Biplane method and Speckle tracking echo method, (Table 2)  
Correlation Co-efficient between SIMPSON & GLS (r = -0.865951)  
Correlation Co-efficient between SIMPSON & TMAD (r = 0.840158)  
Correlation Co-efficient between GLS & TMAD (r = -0.85039)

The significance of Pearson coefficient was explained below,  
P value is less than the significance level ( $\alpha = 0.05$ )

Since, P value is  $< 0.05$  the correlation between Tissue mitral annular displacement and other systolic function assessing parameter (SIMPSON'S & GLS) is Significant.  
Critical value = +0.361  
Since  $r = +0.8$  is more than +0.361, r is significant, and the line may be used for prediction.

CONCLUSION:

Echocardiography plays an important role in day-to-day clinical diagnosis. In patients presenting with clinical diagnosis of Acute Coronary Syndrome, time of management plays significant role. Under this circumstance **the time is muscle**. In such patients the Primary angioplasty gives better outcome in patient prognosis. Usually, left ventricular function was preserved by this Primary PCI. The quantification of Left ventricular Systolic function was assessed using various echocardiographic parameters. Specifically, Biplane Simpson's and Speckle tracking echocardiography methods were widely used. The Tissue mitral Annular Displacement assess the Left Ventricular myocardial deformation in longitudinal manner. It assesses the Left Ventricular systolic function by the displacement of mitral annulus toward Apex. Tissue Mitral Annular Displacement was significantly correlated with other systolic function parameters like Simpson derived Ejection Fraction and Global Longitudinal Strain %. Hence, Tissue Mitral Annular Displacement might also be used as Left Ventricular systolic function assessing Echocardiographic marker and it was less time consuming.

Authors' Contributions:

Mobeen Quadri was responsible for data collection and interpretation. Mobeen Quadri and Ashok G, collaboratively drafted the manuscript, while Mobeen Quadri also undertook critical review and revisions. All authors made equal contributions to the study and accept full accountability for the integrity and accuracy of the work.

Tables :

| Table 1: Demographic Distribution, Age Stratification, and Co-Morbidities of Patients |                                              |                        |
|---------------------------------------------------------------------------------------|----------------------------------------------|------------------------|
| Category                                                                              | Details                                      | Number of patients (%) |
| 36                                                                                    | International Journal of Scientific Research |                        |

|                    |                   |          |
|--------------------|-------------------|----------|
| Patient Demography | Male              | 40 (63%) |
|                    | Female            | 20(33%)  |
| Age Group          | 40–50 years       | 30 (50%) |
|                    | 50–60 years       | 16 (27%) |
|                    | 60–70 years       | 14 (23%) |
| Co-Morbidities     | Hypertension      | 24 (40%) |
|                    | Diabetes Mellitus | 20(33%)  |
|                    | Dyslipidaemia     | 10 (16%) |
|                    | Hypothyroidism    | 6 (10%)  |

Table 2 Represents The Correlation Coeffecient Between Biplane Method And Speckle Tracking Echo Parameters

| PARAMETERS     | VALUE (R) | CORRELATION         |
|----------------|-----------|---------------------|
| SIMPSON & GLS  | -0.865951 | MODERATELY NEGATIVE |
| SIMPSON & TMAD | 0.840158  | MODERATELY POSITIVE |
| GLS & TMAD     | -0.85039  | MODERATELY NEGATIVE |

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