



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

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ABSTRACT

Background: Coronary artery disease (CAD) remains a leading cause of morbidity and mortality worldwide. Timely intervention through primary percutaneous coronary intervention (PCI) in patients with acute coronary syndrome (ACS) can significantly preserve left ventricular (LV) function. **Objective:** To assess LV systolic function in primary PCI patients using Biplane Simpson's method and Speckle Tracking Echocardiography (STE), including Tissue Mitral Annular Displacement (TMAD) and Global Longitudinal Strain (GLS). **Methods:** This prospective observational study enrolled 30 patients presenting with ACS who underwent primary PCI. Post-procedural echocardiographic evaluation included Biplane Simpson's method, GLS, and TMAD. Correlation between these methods was statistically analyzed. **Results:** Among 30 patients (67% male), the mean LV ejection fraction (EF) via Biplane Simpson's method was 60.2%. The mean GLS was -13.7%, and TMAD averaged 8.07 mm. A significant correlation was observed between Simpson's EF and GLS ($r = -0.87$, $p < 0.05$), and between Simpson's EF and TMAD ($r = 0.84$, $p < 0.05$). **Conclusion:** TMAD correlates well with established LV systolic function parameters such as GLS and Simpson's EF. Given its simplicity and speed, TMAD may serve as a reliable surrogate marker in rapid clinical assessments.

KEYWORDS : Left ventricular function, Speckle tracking echocardiography, Biplane Simpson's method, Primary PCI, TMAD, GLS

INTRODUCTION

Coronary artery disease (CAD) is a progressive condition that can lead to acute coronary syndrome (ACS), characterized by myocardial ischemia and infarction. Primary percutaneous coronary intervention (PCI) remains the gold standard treatment for ST-elevation myocardial infarction (STEMI), aiming to promptly restore myocardial perfusion. The functional assessment of the myocardium post-PCI is crucial to evaluate recovery and guide further management.

Echocardiography, especially with speckle tracking and strain imaging, allows precise evaluation of LV function. This study aimed to compare conventional Biplane Simpson's method with more advanced echocardiographic techniques like GLS and TMAD in patients undergoing primary PCI.

MATERIALS AND METHODS

Study Design And Setting: A prospective observational study conducted at Chettinad Super Speciality Hospitals and Research Institute, Kelambakkam, between January and May 2024.

Inclusion Criteria:

Patients aged 40–70 years with ACS and comorbidities like diabetes, hypertension, dyslipidemia, and hypothyroidism who underwent successful primary PCI.

Exclusion Criteria:

Pregnant patients, those with psychiatric illness, or arrhythmias were excluded.

Echocardiographic Evaluation:

Biplane Simpson's Method: EF calculated using apical 2- and 4-chamber views.

Global Longitudinal Strain (GLS): Acquired via apical views using STE.

Tissue Mitral Annular Displacement (TMAD):

Derived from the basal mitral annulus motion during systole.

Statistical Analysis:

Correlation between EF, GLS, and TMAD was assessed using Pearson's correlation. A p value < 0.05 was considered significant.

RESULTS

Out of 30 patients, 20 were male (67%). The majority belonged to the 40–50 age group. Hypertension (40%) and diabetes (33%) were the most common comorbidities.

Mean EF (Simpson's method): 60.2%

Mean GLS: -13.7%

Mean TMAD: 8.07 mm

Correlations:

Simpson's EF & GLS: $r = -0.865$, $p < 0.001$

Simpson's EF & TMAD: $r = 0.84$, $p < 0.001$

GLS & TMAD: $r = -0.85$, $p < 0.001$

DISCUSSION

Our findings reveal significant correlations between conventional EF and newer strain imaging parameters. TMAD, being less time-consuming and technically simpler, demonstrated reliable association with GLS and Simpson's EF, making it a viable alternative for assessing LV systolic function in busy clinical settings.

CONCLUSION

TMAD offers a promising, efficient, and reliable echocardiographic marker for LV systolic function in primary PCI patients. Its integration into standard post-PCI assessment protocols could enhance workflow and diagnostic accuracy.

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