Assessment of right ventricular function in patients presenting with inferior ST segment elevation myocardial infarction and right ventricular infarction undergoing primary percutaneous intervention by different echocardiographic modalities in correlation with angiographic findings

Thesis

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First and foremost thanks to **ALLAH**, the most merciful

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List of Abbreviations

Abb.	Meaning
2DE	Two dimensional echocardiography
3D	Three-dimensional
3DE	Three dimensional echocardiography
A4C	Apical four chamber
AV	Atrio-ventricular
CAD	Coronary artery disease
CCU	Coronary care unit
CMR	Cardiac magnetic resonance imaging
CT	Computed tomography
CVD	Cardiovascular disease
CVP	Central venous pressure
DTI	Doppler tissue imaging
ECG	Electrocardiogram
ECG	Electrocardiogram
EF	Ejection fraction
FAC	Fractional area change
FN	False negative
FP	False positive
GE	General electric
gm	Gram

List of Abbreviations

Abb.	Meaning
HbA1C	Glycated hemoglobin
HS	Highly-significant
IMI	Inferior wall myocardial infarction
IRA	Infarction related artery
IVA	Isovolumic myocardial acceleration
IVCT	Isovolumic contraction time
IVRT	Isovolumic relaxation time
LA	Left atrium
LAD	Left anterior descending
LAD	Left atrial diameter
LCX	Left circumflex artery
LV	Left ventricle
LVEDD	Left ventricular end diastolic diameter
LVEF	Left ventricular ejection fraction
LVESD	Left ventricular end systolic diameter
LVMI	Left ventricular myocardial infarction
MDCT	Multi-detector computed tomography
mg	Milligram
MI	Myocardial infarction
mm	Millimeter
M-mode	Time-motion mode

List of Abbreviations

Abb.	Meaning
MPI	Myocardial performance index
MRI	Magnetic resonance imaging
mV	Millivolt
NPV	Negative predictive value
NS	Non-significant
OM	Obtuse marginal
PA	Pulmonary artery
PCI	Percutaneous coronary intervention
PCI	Percutaneous coronary intervention
PCPS	Percutaneous cardiopulmonary support
PDA	Posterior descending artery
PFO	Patent foramen ovale
PLAX	Parasternal long axis
PP	Post prandial
PPV	Positive predictive value
PSAX	Parasternal short axis
PTCA	Percutaneous transluminal coronary angioplasty
PTD	Pain to door time
PWD	Pulsed wave doppler
PWD	Pulsed wave doppler
PWP	Pulmonary wedge pressure

List of Abbreviations

Abb.	Meaning
RAP	Right atrial pressure
RCA	Right coronary artery
RIMP	RV index of myocardial performance
RV	Right ventricle
RVd2	Right ventricular mid-cavitary diameter
RVFW	Right ventricular free wall
RVFWS	Right ventricular free wall strain
RVGLS	Total RV global longitudinal strain
RVMI	Right ventricular myocardial infarction
S	Significant
S’	Systolic TV annular excursion velocity
SD	Standard deviation
STE	Speckle tracking echocardiography
TAPSE	Trans-annular plane systolic excursion
TIMI	Thrombolysis in myocardial infarction
TN	True negative
TP	True positive
VAD	Ventricular assisted device

Abstract

Background: Right ventricular involvement appears to be an independent prognostic factor that increases in-hospital morbidity and mortality, thus, early RVMI diagnosis is essential to trigger an appropriately aggressive treatment protocol that may improve patients' prognosis. Adequate fluid administration in combination with positive inotropic agents and early coronary reperfusion are the cornerstones of this treatment protocol

Aim Of The Study: The main objective of the current study is assessment of right ventricular function in patients presenting with inferior wall myocardial infarction associated with RV infarction undergoing primary percutaneous coronary intervention by different echocardiographic parameters including tricuspid annular plane systolic excursion (TAPSE), myocardial systolic excursion velocity (S'), fractional area change (FAC) and RV free wall strain (RVFWS) in correlation with angiographic findings

Patient and methods: This study included 60 patients presenting by inferior wall ST segment elevation myocardial infarction associated with RV infarction

Results: The current study included 60 individuals who were recruited from Ain Shams university hospitals. All patients were recruited from the Coronary care unit (CCU) presenting with inferior wall myocardial infarction associated with RV infarction.

All 60 patients underwent primary percutaneous coronary intervention and echocardiographic assessment within 48 hours of admission

Conclusions:

- Proximal RCA occlusion as an IRA is more commonly associated with impaired RV function than other culprit vessels.
- Presence of heavy thrombus burden is more commonly associated with impaired RV function in patients presenting with RV infarction.

Kaywords: Apical four chamber, Atrio-ventricular, Coronary artery disease

INTRODUCTION

Right ventricular myocardial infarction (RVMI) accompanies inferior wall myocardial infarction in many cases. The clinical sequelae of RVMI vary from no hemodynamic compromise to severe hypotension and cardiogenic shock.

Right ventricular involvement appears to be an independent prognostic factor that increases in-hospital morbidity and mortality, thus, early RVMI diagnosis is essential to trigger an appropriately aggressive treatment protocol that may improve patients' prognosis. Adequate fluid administration in combination with positive inotropic agents and early coronary reperfusion are the cornerstones of this treatment protocol. [1]

Diagnosis of RVMI is based on physical examination, electrocardiography, echocardiography and coronary angiography. Because the standard 12-lead electrocardiogram is insufficient for the assessment of RV affection, right-sided precordial leads should always be included.

Various echocardiographic techniques such as time-motion mode (M-Mode), two-dimensional echo (2DE), pulsed wave Doppler (PWD), Doppler tissue imaging (DTI), speckle tracking echocardiography (STE) and 3D echocardiography (3DE) provide valuable qualitative and quantitative data

regarding RV dimensions and RV function so they play an important role in diagnosis of RV infarction.[2]

Angiography in most cases reveals occlusion of the right coronary artery (RCA). In patients with left coronary artery dominance, left circumflex coronary artery (LCX) occlusion may also be found. Although uncommon, RV involvement may be present in patients with an occlusion in the left anterior descending artery (LAD). [3]

In contrast to the lengthy historical interest in acute myocardial infarctions of the left ventricle (LVMIs), the clinical consequences of right ventricular involvement were first described only in 1974. [4]

There are limited studies validating usefulness of various echocardiographic parameters of RV function in assessing RV infarction and most of them focused on a single parameter and lacked angiographic correlation.

Also, there are limited studies about using speckle tracking echocardiography in assessment of RV function in patient presenting with RV infarction and most of them lacked angiographic correlation as well.

AIM OF THE STUDY

The main objective of the current study is assessment of right ventricular function in patients presenting with inferior wall myocardial infarction associated with RV infarction undergoing primary percutaneous coronary intervention by different echocardiographic parameters including tricuspid annular plane systolic excursion (TAPSE), myocardial systolic excursion velocity (S'), fractional area change (FAC) and RV free wall strain (RVFWS) in correlation with angiographic findings.