

**Assessment of Longitudinal Strain in The Patients
with STEMI Using Speckle Tracking
Echocardiography. Correlation with Peak Infarction
Mass and Ejection Fraction**

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ

فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا)

سورة النساء الآية ١١٣

Longitudinal strain in patients with STEMI using speckle tracking echocardiography.

Correlation with peak infarction mass and ejection fraction.

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Abstract

Background: As an index of myocardial infarct size (IS), left ventricular (LV) function is a key determinant of the prognosis after an acute myocardial infarction (STEMI). Traditionally, LV function is assessed by the volume-fraction expelled during systole, i.e. ejection fraction (LVEF), or alternatively by semiquantitative visual grading of LV wall dynamics, i.e. wall motion score index (WMSI). Both methods are subject to observer- and expert-dependence; so in search of a less observer-dependent method, two-dimensional deformation imaging by speckle tracking has been proposed.

Aim: Assessment of the global longitudinal peak systolic strain (GLPSS) by speckle tracking echocardiography in patients with STEMI in first 24hrs after primary PCI and its correlation with LV infarction size and ejection fraction.

Materials And Methods: A total of 30 patients with STEMI (mean age 58±8, 25 men) were studied, All patients underwent 1ry PCI. Conventional 2D echocardiography to assess left ventricular ejection fraction (LVEF), wall motion score index (WMSI), and end systolic volume index (ESVI) and speckle tracking echocardiography to assess LV GLPSS was done within 24hr of 1ry PCI. Infarction size was estimated by myocardial perfusion imaging before hospital discharge.

Results: All patients with STEMI had low LV GLPSS (mean $-10.57\pm 2.67\%$). Significant correlation was observed between LV GLPSS and IS ($P=0.03$ $r=0.39$), The cut-off point for GLPSS that defined large myocardial infarction size ($\geq 30\%$ of LV mass) was -11.5% with 93% sensitivity and 67% specificity (area under the curve=0.8), Significant correlation was observed between LV GLPSS and EF ($P=0.01$, $r=0.35$), and WMSI ($P=0.04$, $r=0.5$). WMSI showed the most significant correlation to IS ($P=0.00$, $r=0.64$). Significant correlation was observed between IS and EF ($P=0.04$, $r=0.37$). No significant correlation was found between ESVI and IS ($P=0.4$, $r=0.2$) nor GLPSS ($P=0.08$, $r=0.33$).

Conclusion: Assessment of IS by echocardiography on day 1 after 1ry PCI in patients with STEMI was superior with GLS and WMSI compared with LVEF and ESVI with cut-off point for GLPSS that defined large myocardial infarction size ($\geq 30\%$ of LV mass) was -11.5% with 93% sensitivity and 67% specificity. Since global strain is an inexpensive test, these data may be of health economic interest.

Key words: Longitudinal strain – Speckle tracking echocardiography – STEMI – Infarction size

استحسن
اجتماع لجنة الحكم على الرسالة المقدمة من
الطبيبة / أفدة محمد ربيع
توطئة للحصول على درجة الماجستير (الدكتوراه)
في طب الكلى والكبد

Assessment of longitudinal strain in the patients with STEMI using speckle tracking echocardiography
Correlation with rate of infarction area and myocardial fraction

باللغة الانجليزية
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تضم الوثيقة أطروحة أطلة أفدة محمد ربيع في
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Amira Ismail

List of Abbreviations

2-D	two-dimensional
3D	Three dimensional
ACE	Angiotensin converting enzyme
ACS	Acute coronary syndrome
AFI	<i>Automated function imaging</i>
Avg GLS	Average global longitudinal strain
BP	Blood pressure
BSA	Body surface area
CAD	Coronary artery disease
CE -MRI	Contraste enhanced -magnetic resonance imaging
C-TDI	Coloure- tissue Doppler imaging
DE	<i>Delayed enhancement</i>
DM	Diabetes mellitus
ECG	Electrocardiogram
ESVI	End systolic volume index
GLPSS	<i>Global longitudinal peak systolic strain</i>
GLS	Global longitudinal strain
GLS AP2	Global longitudinal strain from apical 2 chamber

GLS AP3	Global longitudinal strain from apical 3 chamber
GLS AP4	Global longitudinal strain from apical 4 chamber
HTN	Hypertention
ICD	Implantable cardiovertor defibrillator
IS	Infarction size
LAD	Left anterior descending artery
LCX	Left circumflex artery
LVEDD	Left ventricular end diastolic diameter
LVEDV	Left ventricular end diastolic volume
LVEF	Left ventricular ejection fraction
LVESD	Left ventricular end systolic diameter
LVESV	Left ventricular end systolic volume
LVESVI	Left ventricular end systolic volume index
MAR	Myocardial at risk
MI	Myocardial infarction
MPI	Myocardial perfusion imaging
MRI	Magnetic resonance imaging
MVG	Myocardial velocity gradients
NSTEMI	Non ST segment elevation myocardial infarction
PCI	Percutaneous coronary intervention

PW -TDI	Pulsed wave- tissue Doppler imaging
RCA	Right circumflex artery
RLS	<i>Regional Longitudinal strain</i>
SPECT	Single photon emission computed tomography
SR	<i>Strain rate</i>
STE	Speckle tracking echocardiography
STEMI	ST segment elevation myocardial infarction
Tc-99m	Technetium 99m
TDI	Tissue Doppler imaging
TnT	Troponin -T
TPD	Total perfusion defect
TVI	Tissue velocity imaging
VT	Ventricular Tachycardia
WMSI	Wall motion score index

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Introduction