شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

Correlation between Global Longitudinal and Circumferential Peak Systolic Strain and Coronary Artery Disease Severity as Assessed by the Angiographically Derived SYNTAX Score

Thesis

Submitted for Partial Fulfillment of Master Degree in Cardiology

Presented by

Marian Ibrahim Helmy Ibrahim

M.B.B.Ch.

Under Supervision of

Prof.Dr. Ahmed Mohamed Onsy Ibrahim

Professor of Cardiology

Faculty of Medicine – Ain Shams University

Prof. Dr. Yasmin AbdelRazek Esmail

Lecturer of Cardiology

Faculty of Medicine – Ain Shams University

Dr. Islam Mahmoud Bastawy

Lecturer of Cardiology

Faculty of Medicine – Ain Shams University

Cardiology Department

Faculty of Medicine

Ain Shams University

2021

Acknowledgment

First and foremost thanks to **ALLAH**, *the Most Merciful.*

I would like to express my deepest appreciation and gratitude to **Prof. Dr. Ahmed Mohamed Onsy Ibrahim** *Professor of Cardiology – Cardiology department Faculty of Medicine – Ain Shams University, for his help in picking this important and up-to-date subject, and for his continuous and unconditional guidance and support.*

Special thanks are due to **Dr. Yasmin Abdel Razek Esmail,** *Lecturer of Cardiology, Faculty of Medicine, Ain Shams University, for her sincere efforts, fruitful encouragement.*

I am deeply thankful to **Dr. Islam Mahmoud Bastawy,** *Lecturer of Cardiology, Faculty of Medicine, Ain Shams University, for his great help, patience, outstanding support, active participation and guidance.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Marian Ibrahim Helmy Ibrahim

List of Contents

Subject *Page No.*

List of Abbreviations

Abbr.		Full-term
ACC	**:**	American college of cardiology
AHA	**:**	American heart association
AP2LS	**:**	Apical 2 chamber longitudinal strain
AP3LS	**:**	Apical 3 chamber longitudinal strain
AP4L S	**:**	Apical 4 chamber longitudinal strain
BP	**:**	Blood pressure
CABG	**:**	Coronary artery bypass graft
CAD	**:**	Coronary artery disease
CMR	**:**	Cardiac magnetic resonance imaging
CVD	**:**	Cardiovascular disease
DSE	**:**	Dobutamine stress echocardiography
ECG	**:**	Electrocardiogram
EF	**:**	Ejection fraction
GCPSS	**:**	Global circumferential peak systolic strain
GCS	**:**	Global circumferential strain
GE	**:**	General electric
GLPSS	**:**	Global longitudinal peak systolic strain
GLS	**:**	Global longitudinal strain
HbA1C	**:**	Glycated hemoglobin
HS	**:**	Highly-significant
ICPS	**:**	International classification of patient safety
IHD	**:**	Ischemic heart disease
LV	**:**	Left ventricle
M-mode	**:**	Time-motion mode
MRI	**:**	Magnetic resonance imaging
MVD	**:**	Multivessel disease
NS	**:**	Non-significant
PCI	**:**	Percutaneous coronary intervention
PP	**:**	Post prandial

ROI	**:**	Region of interest
S	**:**	Significant
SAX A S	**:**	Short axis apical level strain
SAX B S	**:**	Short axis basal level strain
SAX M S	**:**	Short axis mid-level strain
SD	**:**	Standard deviation
SPECT	**:**	Singlephoton emission computed tomography
SPSS	**:**	Statistical Package for Social Science
SS	**:**	SYNTAX score
STE	**:**	Speckle tracking echocardiography
2D	**:**	Two -dimensional
2D STE	**:**	Two dimensional speckle tracking echocardiography
2DE	**:**	Two dimensional echocardiography

List of Tables

List of Figures

Introduction

The diagnosis and assessment of chronic coronary syndrome involves clinical evaluation, identifying risk factors for atherosclerosis, and specific cardiac investigations such as different stress testing modalities and coronary imaging ***(Bösner et al., 2010).***

Despite the widespread use of imaging and provocative testing, the non-invasive identification of patients with coronary artery disease remains a clinical challenge; more than half of the patients had normal or non-obstructive coronary artery disease on coronary angiography ***(Patel et al., 2010).***

The strain values are better than either wall motion or tissue Doppler in the assessment of regional contraction. Also, strain can be used in assessing myocardial viability either at rest or with stress ***(Bansal et al., 2010).***

Significant coronary artery stenosis might cause persistently impaired longitudinal left ventricular function at rest, so 2D-STE is more accurate than conventional 2D echocardiography in evaluating the regional and global myocardial function and assessing infarct size, the viability of the infarcted myocardium, and mild changes of myocardial ischemia ***(Montgomery et al., 2012).***

STE is a simple, rapid, and accurate method for evaluating the myocardial function, so it is best to assess regional contractile function by measuring peak systolic strain rate or rate of increase of strain rate ***(Witkowski et al., 2012).***

The longitudinal strain provides a good quantitative myocardial deformation assessment of each LV segment allowing early detection of systolic dysfunction in patients with preserved LV ejection fraction ***(Shivu et al., 2009).***

The use of STE longitudinal strain can detect and risk-stratify coronary artery disease with good accuracy and reproducibility.

Strain and strain rate are homogeneously distributed across the myocardium, so mild changes in either measure suggest myocardial dysfunction. Although strain imaging has a potential role in the diagnosis and management of virtually any myocardial disease, its greatest role is in the detection of ischemic heart disease ***(Jamal et al., 2002).***

Aim of the Study

The main objective of the current study is to assess the correlation between the SYNTAX score in patients undergoing elective coronary angiography and the longitudinal and circumferential peak systolic strain performed at rest by speckle tracking echocardiography to predict the presence, extent, and severity of coronary artery disease.

Chapter (1)
Echocardiography in ischemic heart disease

Ischemic heart disease also known as coronary artery disease is one of the major causes of morbidity and mortality. Since the mortality and morbidity of IHD, improve following early treatment, timely diagnosis is of vital importance not only to help the patient who sometimes presents with atypical symptoms or non-diagnostic (ECG) changes or normal cardiac enzyme levels but also to reduce hospital stay and economic costs ***(Esmaeilzadeh et al., 2013; Votavová et al., 2015).***

Imaging techniques represent the key method for disease extent and severity assessment and evaluation of hemodynamic complications. Two-dimensional echocardiography is a non-invasive diagnostic technique and one of the most useful imaging methods which has emerged as a dominant and indispensable technique for the detection and assessment of coronary heart disease due to its accessibility, cost-effectiveness, lowest risk, and its ability to serve as bedside technique and repeatability. It is also is the most frequently utilized cardiovascular diagnostic test after ECG ***(Chaves et al., 2004; Esmaeilzadeh et al., 2013).***