بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

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

MONA MAGHRABY

Assessment of left atrial function in ischemic patients before and after cardiac rehabilitation using speckle tracking

Thesis

Submitted for Partial Fulfillment of Master Degree
In Cardiology

By

Salah El-din Nemr Ali Alijla
M.B.B.Ch.

Under supervision of

Prof. Dr. Khaled Mohamed Said Othman
Professor of cardiology - Cardiology department
Faculity of medicine - Ain Shams University

Dr. Ahmed Ibrahim El Desoky
Lecturer of Cardiology – Cardiology department
Faculty of Medicine – Ain Shams University

Cardiology Department
Faculty of Medicine
Ain Shams University
2021

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Khaled Mohamed Said Othman,** *Professor of Cardiology - Cardiology department - Faculty of Medicine- Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to **Dr. Ahmed Ibrahim El Desoky,** *Lecturer of Cardiology – Cardiology department, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

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

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Salah El-din Nemr Ali Alijla

List of Contents

List of Tables

Table No. ***Title*** ***Page No.***

List of Figures

List of Figures (cont…)

Figure No. ***Title*** ***Page No.***

List of Abbreviations

Abb.	*Full term*
Abb.	*Full term*
AF	Atrial fibrillation
AMI	Acute myocardial infarction
AP	Antero-posterior
AR	Aortic regurgitation
CABG	Coronary artery bypasses grafting
CCS	Chronic coronary syndrome
CHD	Coronary heart disease
CI	Confidence interval
CR	Cardiac rehabilitation
cTn	Cardiac troponin
DES	Drug-eluting stents
ECG	Electrocardiogram
GE	General electric
HIIT	High intensity interval training
HR	Heart rate
HRR	Heart rate reserve
LA	Left atrium
LAD	Left anterior descending artery
LAV	LA volume
LAVI	Left atrial volume index
LAVmax	Maximum LA volume
LAVmin	Minimum LA volume

List of Abbreviations (cont…)

LDL	Low-density lipoprotein
LV	Left ventricular
METs	Metabolic equivalents
MR	Mitral regurgitation
MRI	Magnetic resonance imaging
NYHA	New york heart association
PACS	Peak atrial contraction strain
PALS	Peak atrial longitudinal strain
PCI	Percutaneous coronary intervention
RHR	Resting heart rate
ROI	Region of interest
RR	Relative risk
SPSS	Statistical package for social science
SR	Strain rate
STE	Speckle tracking echocardiography
STEMI	ST-elevation myocardial infarction
SWMA	Segmental wall motion abnormalities
TR	Tricuspid regurgitation
VF	Ventricular fibrillation
VI	Volume index
ε	Left atrial strain
ε′	The strain rate

Introduction

Coronary heart disease (CHD) is one of the most common forms of heart disease. It affects the heart by restricting or blocking the flow of blood around it. This can lead to anginal pain or myocardial infarction. Exercise-based cardiac rehabilitation aims to restore people with CHD to health through combination of exercise with education and psychological support [(1)].

Cardiac rehabilitation is a medically supervised program designed to improve cardiovascular health in patient with myocardial infarction, heart failure, angioplasty or heart surgery [(2)].

The left atrium (LA) is not only a simple passive transport chamber. It is highly dynamic and responds to stretch with the secretion of atrial natriuretic peptides. The counterbalance of natriuresis, vasodilatation, and inhibition of the sympathetic and renin–angiotensin–aldosterone systems allows partial restoration of fluid and haemodynamic balance [(3)].

LA function has been conventionally divided into three phases: first, as a reservoir, the LA stores pulmonary venous

return during left ventricular (LV) contraction and isovolumetric relaxation. Secondly, as a conduit, the LA transfers blood passively into the LV. Thirdly, the LA actively contracts during the final phase of diastole and contributes between 15 and 30% of LV stroke volume. As a continuum of the LV, especially during diastole, its size and function are very much influenced by the compliance of the LV[(4)].

The LA plays an important role in the development of many heart diseases, and its size and function are closely correlated with various cardiovascular events. The mitral valve ring moves downward during LV systole, and the LA is directly affected by LV pressure during the entire diastole. LV systolic and diastolic functions are both impaired in patients with ischemic heart disease. The reservoir function of the LA is impaired because the mitral valve ring is not completely downcast during systole, and the LA contraction capacity can also be affected by LV diastolic dysfunction. Therefore, the clinical relevance of LA function is increasingly acknowledged [(5)].

Speckle tracking has recently emerged as quantitative ultrasound technique for accurately evaluating myocardial

function by analyzing the motion of speckles identified on routine 2-dimentional sonograms. It provides non-doppler, angle independent and objective quantification of myocardial deformation.

Speckle tracking echocardiography is based on an analysis of spatial dislocation (referred to as tracking) of speckles (defined as spots generated by the interaction between the ultrasound beam and myocardial fibers) on routine 2-dimentional sonograms [(6)].

By tracking the displacement of speckles during the cardiac cycle speckle –tracking echocardiography allow semi-automated elaboration of myocardial deformation. Although this new technique was introduced for exclusive analysis of LV function, several studies have recently extended its applicability to other cardiac chambers, such as the left atrium and right ventricle [(7)].

In the present study, we use speckle tracking echocardiography to evaluate the LA strain and strain rates in patients with ischemic heart disease [(8)].