Detection of Subclinical Left Ventricular Dysfunction in Hypertensive Patients Using Speckle Tracking Echocardiography

Thesis

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BY

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LIST OF ABBREVIATION

A	Atrial kick mitral inflow velocity
A`	Atrial annular velocity
ABI	Ankle brachial index
ABP	Arterial blood pressure
ABPM	Ambulatory Blood Pressure Monitoring
ACEI	Angiotensin convertor enzyme inhibitor
ARBs	Angiotensin convertor enzyme inhibitor
ASE	American Society of Echocardiography
BB	Beta blockers
BMI	Body mass index
BP	Blood pressure
BSA	Body surface area
CHD	Cardiovascular heart disease
CI	Confidence interval
CKD	Chronic kidney disease
DBP	Diastolic Blood Pressure
DD	Diasdtolic dysfunction
DT	Deceleration time
E	Early mitral inflow velocity
E`	Early diastolic annular velocity
EAE	European Association of Echocardiography.
EAS	European atherosclerosis Society
EAT	Epicardial atrial thickness
ECG	Electrocardiogram
ED	End Diastolic
EDV	End diastolic volume
EF	Ejection fraction
eGFR	Estimated glomerular filteration rate
ES	End systolic
ESRD	End stage renal disease

ESV	End systolic volume
GFR	Glomerular filtration rate
GLS	Global longitudinal strain
H	Height in cm
HF	Heart failure
HFpEF	Heart failure with preserved ejection fraction
HTN	Hypertension
IDDM	Insulin dependent diabetes mellitus
ISH	Ischemic heart disease
IVRT	Isovolumetric relaxation period
L	Length
LA	left atrium
L_o	Intial length
LS	Longitudinal strain
Lt	Length in a given time
LV	Left ventricle
LVH	left ventricular hypertrophy
LVIDd	LV internal dimensions in diastole
LVIDs	LV internal dimensions in systole
LVMI	Left Ventricular mass index
MAPSE	Mitral annular plane systolic excursion
MI	Myocardial infarction
MRI	Magnetic resonance imaging
NIDDM	Non-Insulin dependent diabetes mellitus
OD	Organ damage
OR	Odds ratio
PAD	Peripheral arterial disease
PWT	Posterior wall thickness
PWV	Pulsed wave velocity
r	Radius
RAS	Renin angiotensin system
RCTs	Randomized controlled trials
RF	Risk factors
ROI	Region of interest
RSWMA	Resting segmental wall motion abnormality

S	Systolic velocity of mitral annulus
SBP	Systolic blood pressure
SCORE	Systemic coronary risk evaluation
SD	Standard deviation
SPSS	Statistical package for social science
SR	Strain rate
STE	Speckle tracking echocardiography
SWT	Septal wall thickness
T	Tension in LV wall
TDI	Tissue Doppler imaging
V	Velocity
Vp	Velocity of propagation
Vs.	versus
W	Weight in kg
ἐ	Strain rate

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Introduction

Hypertension is one of the most common diseases among population; it is the leading attributable risk factor for developing heart failure with preserved EF, which is today a hypertension related complication almost as common as stroke. Heart failure is usually a progressive condition that begins with risk factors for LV dysfunction (e.g., hypertension), proceeds to asymptomatic changes in cardiac structure (e.g., LV hypertrophy) and function (e.g., impaired relaxation), and then evolves into clinically overt heart failure, disability and death.

(Tocci et al., 2008)

Patients with hypertension usually present with concentric remodeling or concentric LV hypertrophy, despite of having normal-sized LV chamber and normal EF, even in the presence of a reduced longitudinal systolic function.

(Imbalzano et al., 2011)

Echocardiography is used to assess early subclinical changes in systolic and diastolic LV function. Nowadays, tissue speckle tracking provide additional information about global and regional cardiac function over and beyond classical

M-mode and 2D echocardiography, pulsed-wave Doppler & tissue Doppler index (TDI).

(Rover et al., 2006)

Tissue Speckle tracking analyze speckle artifacts in the echo image to obtain information of myocardial contractility and also on relaxation. Speckles are small areas of higher echogenicity which are caused by reflections, refraction, and scattering of echo beams. By tracking such speckles in the wall of the left ventricle throughout the cardiac cycle it is possible to obtain information on the direction and velocity of motion.

Comparing the motion of individual speckles to each other allows us to analyze the deformation of the myocardium.

(Saha et al., 2012)

Aim of the work

We aim to use Speckle Tracking echocardiography (Longitudinal Strain pattern) to detect subclinical left ventricular dysfunction in hypertensive patients with normal systolic function detected by 2D Echocardiography