ASSESSMENT OF RIGHT VENTRICULAR FUNCTION AT REST AND DURING EXERCISE IN PATIENTS WITH CORONARY HEART DISEASE

A NEW APPROACH USING EQUILIBRIUM RADIONUCLIDE ANGIOGRAPHY

Thesis
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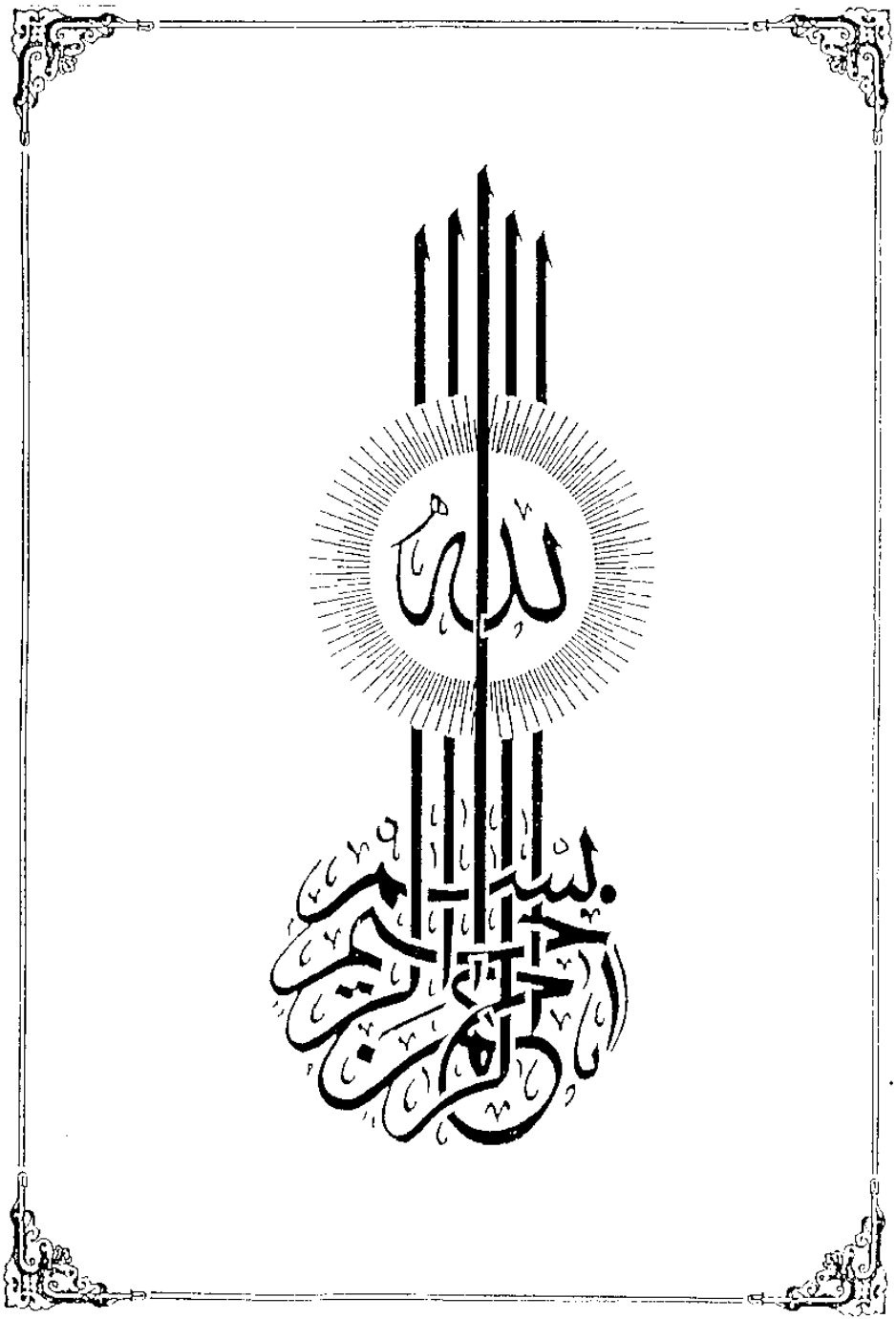
بسم الله الرحمن الرحيم

«قَالَ رَبِّ اشْرَحْ لِي صَدْرِي * وَيَسِّرْ لِي أَمْرِي * وَاحْلُلْ عُقْدَةً مِّن لِّسَانِي* يَفْقَهُوا قَوْلِي»

صدق الله العظيم

طه (الآية ٢٥ - ٢٨)



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LIST OF ABBREVIATIONS

ATP	Adinosine -S-triphosphate
Au-195m	gold -195 m
AVN	Atrioventricular node
BATO (Teboroxime)	Boronic acid adduction of technitium oxime
CAD	Coronary artery disease
Cd-109	Cadium - 109
C-HED	C-hydroxy ephedrine
CK	Creatine kinase
COP	Cardiac out put
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
DTPA	Diethylene triaminepenta acetic acid
ECG	Electrocardiogram
EDV	End-diastolic volume
ERNA	Equilibrium radionuclide angiocrdiography
FDG-18	Flurodeoxy glucose -18
FPKNA	First pass Radionuclide Angiocardiography
GMP	Cyclic gunosine monophosphate
Hg-195m	Mercury -195 m
I-123	Iodine -123

In-111	Indium-111
Ir-191m	Iridium -191 m
IVS	Interventricular septum
K	Potassium
KeV	Kilo electrone volt
Kr - 81m	Krypton - 81 m
LAO	Left anterior oblique
LV	Left ventricle
m sec	milli second
mCi	Mili Curi
MIBI	Hexakis 2 methoxy-2- isobutyle isonitrate
MRI	Manetic resonance imaging
N-13	Ammonia-13
0-15-water	0-15 laeled water
Na	sodium
NH3-13	Amonia-13
OS-191	Osmium - 191
PA	Pulmonary artery.
PET	Positron emission tomography
RAO	Right anterior oblique

Rb-82	Rubidium-82
ROI	Region of interest
Rv	Right ventricle
RVEF	Right ventricular ejection fraction
RVFW	Right ventricular free wall
RVMI	Right ventricular myocardial infarction
RVWT	Right ventricular wall thickness
SAN	Sinoatrial node
SEE	Standard error estimate
SPECT	Single Photon Emission Computed Tomography
TAPSE	Tricuspid annular plane systolic excursion.
Tc-99m	Technitium - 99 m
TI-201	Thalium -201
VSR	Ventricular septal rupture

CONTENTS

I. INTRODUCTION & AIM OF THE WORK

INTRODUCTION

Myocardial ischemia results from deficiency of blood supply to the heart, which when prolonged might lead to myocardial infraction. Both ischemia and infraction affect the functions of the left ventricle leading to decrease in over all contractility as assessed by ejection fraction. Previous studies showed that the left ventricular function is a major determinant of the outcome in acute myocardial infarction and that mortality during the first year increases progressively as left ventricular ejection fraction drops below 40% *(Broder et al., 1972).*

On the other hand, right ventricular infarction is not uncommon and it usually complicates inferior rather than anterior wall myocardial infarction with the subsequent results of right ventricular failure which is a very critical situation that could be fatal if not rapidly diagnosed and properly treated.

Therefore, the study of right ventricular function is important and it should improve our understanding of the pathophysiology and management of cardiac disorders *(Marmer et al., 1981).*

However, the visualization of the right ventricle by currently used methods is difficult due to the unusual shape of the right

ventricle. By echocardiography, right ventricular infarction was seen as dilated right ventricle with akinesia of its lateral free wall but no description of right ventricular functions in chronic coronary ischaemia was reported *(Cohn et al., 1974)*.

Among the other methods used is first pass ejection fraction by radionuclide angiography which also appears difficult to interpret due to the relatively few cardiac cycles associated with a bolus injection of radionuclide material in an arm vein *(Johnson et al., 1979)*.

But now, thanks for the presence of equilibrium radionuclide angiography, studying right ventricular functions have become possible. With this technique, right ventricular global ejection fraction can be determined at rest and during exercise.

This method could be applied for patients with chronic ischemic heart disease to evaluate their right ventricular functions at rest and during exercise for evaluation or right ventricular dysfunction secondary to right ventricular ischemia *(Slutsky et al., 1980)*.

AIM OF THE WORK

Is to evaluate the right ventricular functions at rest and during exercise by equilibrium radionuclide angiography in patients with coronary heart disease in order to establish a relationship between the site and extent of the lesions in coronary angiography and the development of right ventricular dysfunction secondary to right ventricular ischemia.

II. REVIEW OF LITERATURE

ANATOMY & BLOOD SUPPLY OF THE RIGHT VENTRICLE

The right ventricle is normally the most anterior cardiac chamber, lying directly beneath the sternum. It is partially below, infront of, and medial to the atrium, but anterior and to the right of the left ventricle. *(Schlant, 1990).*

It extends from the right atrium to the apex of the heart. Its antro-superior surface is convex, and forms the large part of the sternocostal surface of the heart. In the greater part of its extent, it is separated from the chest wall by the pericardium, and to a lesser extent by the anterior margin of the left lung and pleura both above and to the left side. The inferior wall is flat and is related to the central tendon of the diaphragm. *(Warwick and Williams, 1973).*

The interventricular septum bulges in the right ventricle forming its posterior surface, that is why the right ventricle appears as a crescent - shaped chamber in cross section. *(Schlant, 1990).*

The wall of the right ventricle is thinner than the left with the proportion between them being about 1:3. The right ventricle is 3-4mm in thickness. It is thickest at the atrial end and gradually becomes thinner towards the apex of the ventricle. *(Warwick and Williams, 1973).*

Functionally, the right ventricle can be partitioned into an inflow tract, an out flow tract, and an apical trabeculated part. The trabecular