CORRELATION BETWEEN ST-SEGMENT REGRESSION AND WALL MOTION ABNORMALITIES AFTER ACUTE MYOCARDIAL INFARCTION

A Thesis

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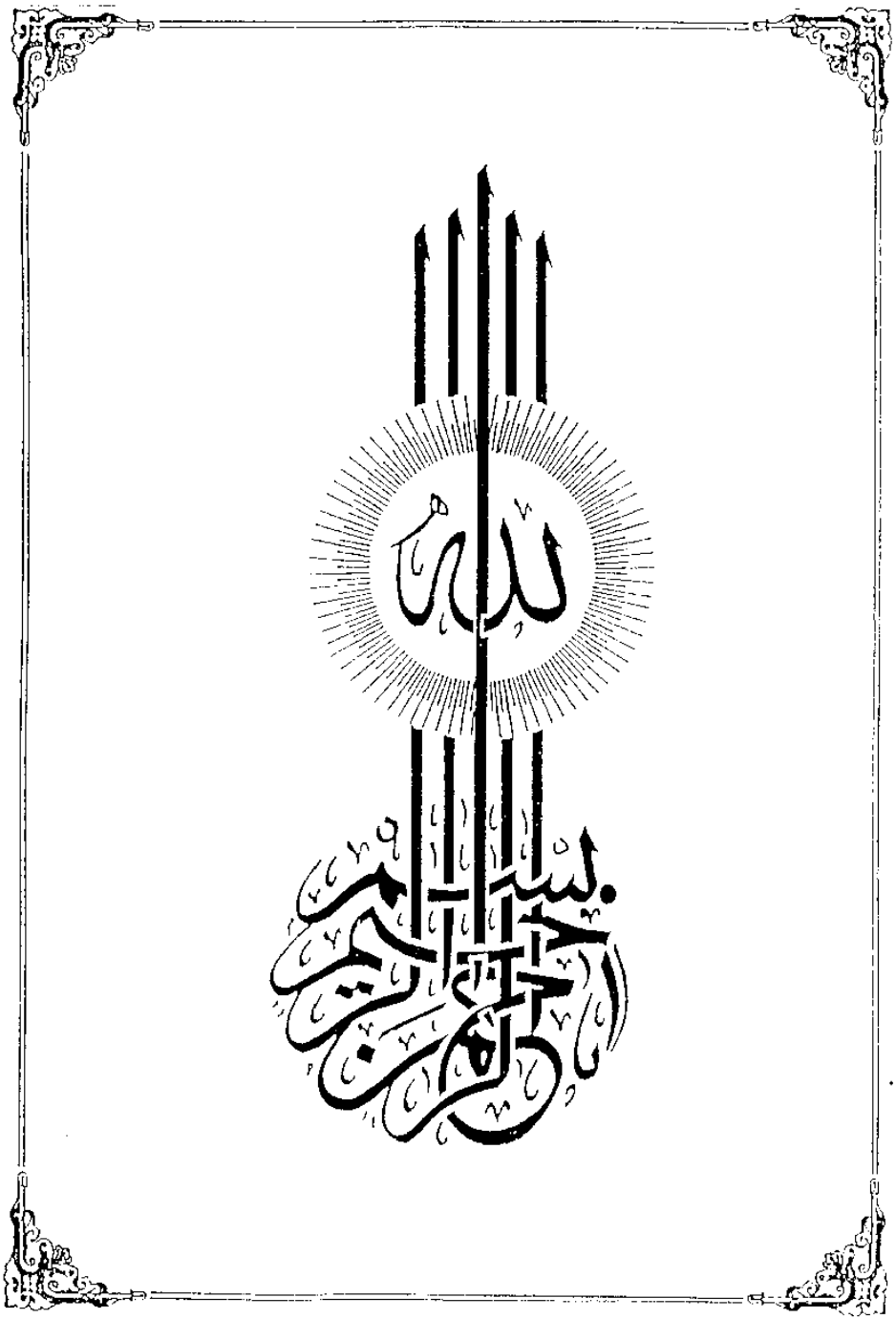
Maged Ramses



This work
is dedicated to

My Family

CONTENTS

LIST OF ABBREVIATIONS

2-D	Two-dimensional
AIVR	Accelerated idioventricular rhythm
AMI	Acute myocardial infarction
CAD	Coronary artery disease
CK	Creatine kinase
CPK	Creatine phosphokinase
EDV	End diastolic volume
EF	Ejection fraction
ESV	End systolic volume
IRA	Infarct related artery
LAD	Left anterior descending
LV	Left ventricle
MI	Myocardial infarction
PET	Positron emission tomography
RV	Right ventricle
SK	Streptokinase
SVT	Supraventricular tachycardia
VT	Ventricular tachycardia
WMA	Wall motion abnormalities
WMI	Wall motion index

INTRODUCTION

Myocardial infarction is myocardial necrosis occurring as a result of a critical imbalance between coronary blood supply and myocardial demand. The necrosis may be confined to subendocardial region or may affect the full thickness of the myocardium [transmural infarction]. The latter is usually associated with total, but sometimes transient occlusion of the coronary artery supplying the area. This usually occurs at the site of a preexisting atheromatous plaque (John et al., 1987).

Thrombolytic therapy is used frequently in patients with AMI aiming at reperfusing the occluded vessel and to reduce the myocardial infarction size and this to preserve the LV function (Julian et al., 1989).

As approximately 80% of patients presenting within 6 hours of the onset of symptoms of acute transmural MI exhibit occlusive thrombi demonstrable angiographically (De Wood et al., 1980), so prompt recanalization result in virtually complete salvage of the initially jeopardized myocardium and reperfusion later elicits progressively less salvage in a markedly time-dependent fashion (Bergmann et al., 1982).

So, it is important to assess the efficacy of coronary thrombolysis and the methods of assessment are either invasive or non-invasive:

I- Direct [invasive] Evaluation of the Patency of the IRA:-

a- Recanalization trials used angiography to document occlusive thrombus prior to treatment and again after treatment to document clot lysis (Collen et al., 1984; Williams et al., 1986) and the results of such trials are the most definitive and provide the only unequivocal criteria for defining efficacy of clot lysis. Unfortunately cardiac catheterization required entails unavoidable delay prior to treatment that can compromise salvage of jeopardized myocardium (O'Neil et al., 1988).

b- Patency trials utilized angiography but only after thrombolysis has been attempted (Verstraete et al., 1985; Topol et al., 1987). Delay in the onset of treatment can therefore be avoided. However, results are not definitive because some patients considered to be improved judging from the presence of patent vessels may not have had occluded arteries at all (De Wood et al., 1980).

II. Indirect [non-invasive] Evaluation of the Patency of IRA:-

It includes evaluation of myocardial perfusion, metabolism, function and the ultimate extent of infarction, infarct size as well as assessment of clot lysis per se (Sobel et al., 1982).

a- Infarct size can be estimated with the use of serial ECGs, plasma

CK time-activity curves, and scintigraphy with infarct-avid radiotracers.

b- Myocardial perfusion can be characterized with thallium-201 gamma scintigraphy and PET.

c- Regional and global ventricular function can be delineated non-invasively by radionuclide ventriculography and 2-D echocardiography.

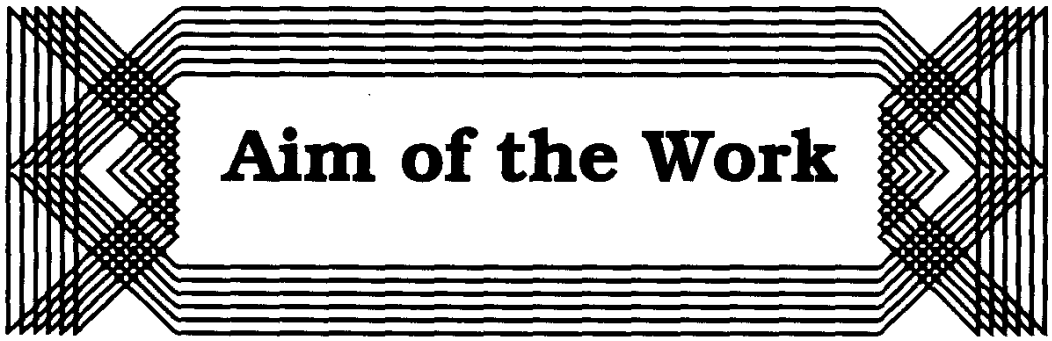
d- Myocardial metabolism can be characterized by PET with physiologic substrates of myocardium labeled with positron-emitting radionuclides. Each of these approaches exhibits some limitations but in aggregate they may help to define the patency of IRA non-invasively (Sobel et al., 1982).

Successful thrombolytic therapy appears to alter events after the infarction such as the ST-segment in ECG and the WMA by 2-D echocardiography and these changes appear to be perfusion dependent (Timmis et al., 1982).

The ST-segment changes are a well known dynamic indicator of pathophysiologic changes during AMI. Delineation of changes in ST-segment evolution resulting from intervention into the infarction process may provide sensitive easily obtained non-invasive evidence of impact of such therapies. Quantitative ST-segment mapping in patients receiving thrombolytic therapy has previously focused on myocardial infarct size. However, dynamic ST-changes in human appear to be

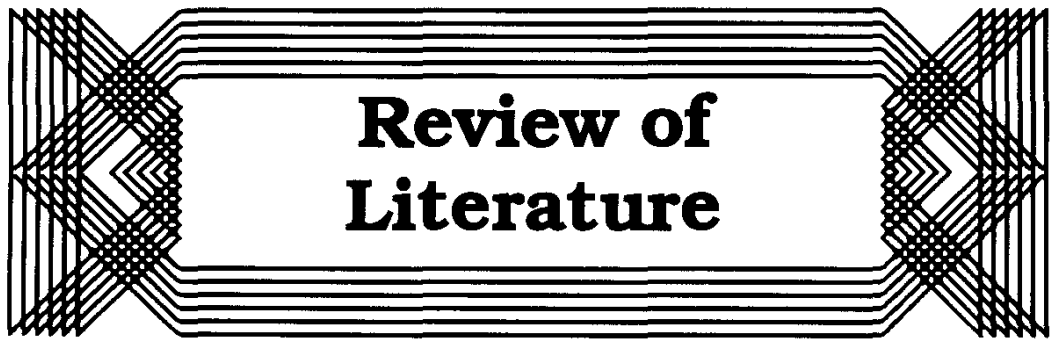
uniquely sensitive to changes in coronary artery patency (Kriacoff et al., 1986).

The role of 2-D echocardiography in the assessment of ischemic heart disease is well established. Not only does 2-D echocardiography allow direct and adequate visualization of regional WMA in real time during chronic and acute phases of coronary insufficiency but it also allows accurate localization of areas of infarction. In addition, the wall motion score determined by 2-D echocardiography, an index of LV function, has been shown to be a good predictor of in-hospital prognosis and prognosis after dismissal (Shen et al., 1991).



AIM OF THE WORK

The aim of this study is to assess the value of "the rate of regression of elevated ST-segment" as a simple, non-invasive and readily available tool for evaluating the efficacy of coronary thrombolysis. The assessment of "ST-segment regression" will be through assessing its correlation with echocardiographic LV segmental wall motion analysis in patients suffering from AMI and receiving thrombolytic therapy.



Chapter 1

VALUE OF ECHOCARDIOGRAPHY IN THE ASSESSMENT OF THE EFFICACY OF CORONARY THROMBOLYSIS

A- Assessment of Global LV Function

Most of the clinicians have become impressed with the clinical utility of the EF as a means of evaluation of LV function in patients with CAD. As a result, physicians either have ignored echocardiography as a means of assessing LV function in patients with CAD or have insisted on a measurement of EF (Erbel et al., 1980).

I- Methods:

❶ By 2-D echocardiography:

Van et al (1984) and Kan et al (1984) attempted measurements of EF and LV volumes in patients with CAD by simulation of the angiographic EF using the apical 2-chambers and 4-chambers views for calculating LV volumes and EF. They used standard angiographic area-length formulas or Simpson's rule for calculating volumes.

Ryan et al (1986) have used the minor axis measurements to assess the LV function. Both the minor axis dimension of the base of the heart using the parasternal long axis view and the minor axis area