THE STUDY OF INTERVENTRICULAR SEPTAL WALL MOTION AND THICKNESS BY ECHOCARDIOGRAPHY IN PATIENTS WITH VALVULAR HEART DISEASES.

THESIS

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By
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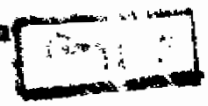

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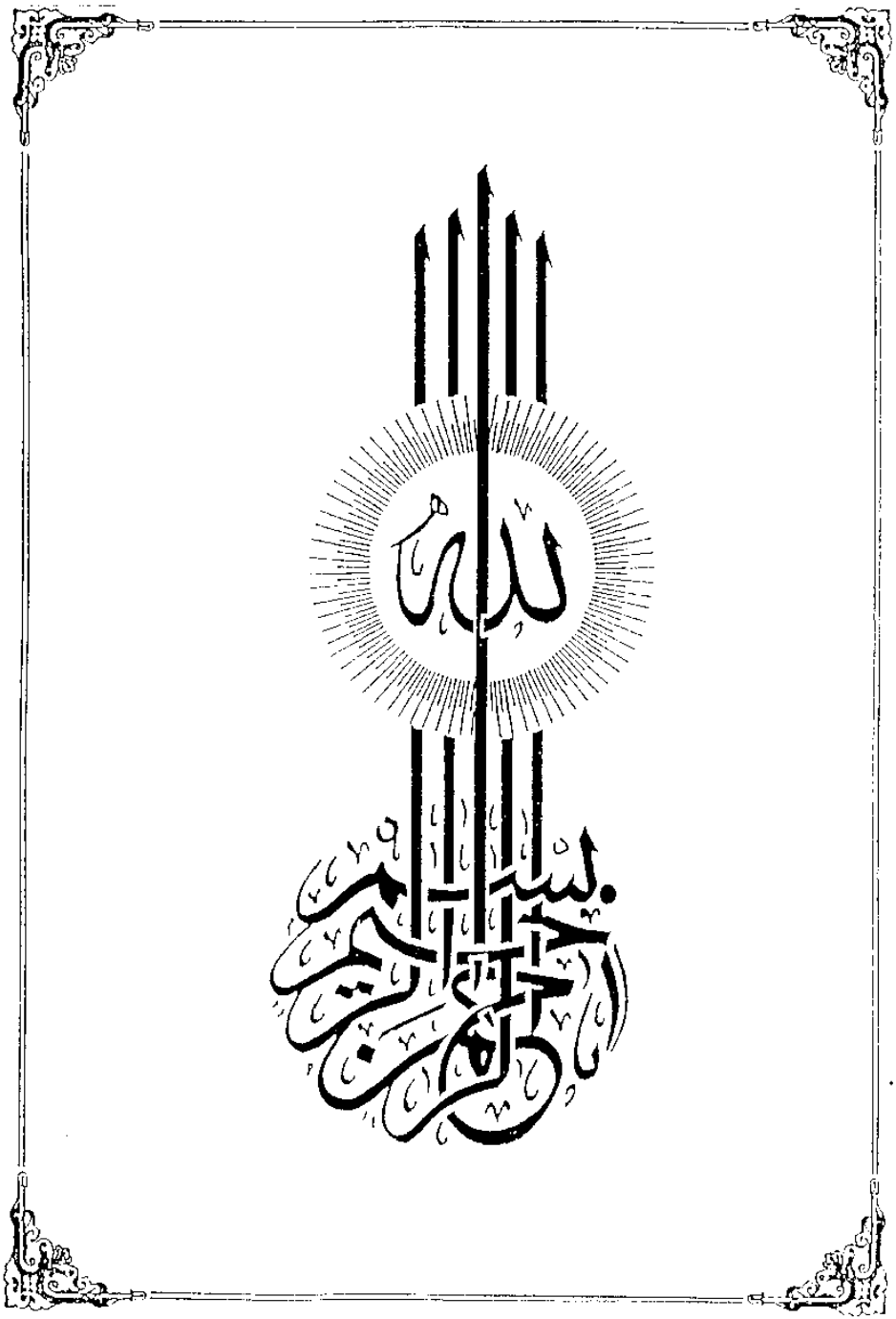

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INTRODUCTION

THE STUDY OF THE INTERVENTRICULAR SEPTAL WALL MOTION AND THICKNESS BY ECHOCARDIOGRAPHY IN PATIENTS WITH VALVULAR HEART DISEASES

Introduction:

The interventricular septum forms an integral part of both right and left ventricles, and is under the effects of pressure and volime from each ventricle simultaneously. Prior to the ultrasound studies in cardiovascular investigation, there has been no satisfactory non-invasive technique for studying the motion and thickness of interventricular septum in human beings.

Echocardiography is now an established, non-invasive technique in the assessement of ventricular function and anatomy. The echoes from interventricular septum were originally identified by Elder and co-workers (24), and were later utilized in the study of the right and left ventricular size. Diamond and co-workers have demonstrated the usefulness of septal echo in identifying patient with ASD defect (22). Abbasi and co-workers and Henry Clark, Epstein and co-workers have identified a characteristic

echocardiographic septal abnormality in patients with idiopathic hypertrophic subaortic stenosis (1,15,64). Corya and co-workers demonstrated the abnormal septal motion in patients with coronary artery disease (18, 19). All these studies which were done on interventricular septum using echocardiogram demonstrated the abnormal motion and thickness of interventricular septum in different types of heart disease, especially in patients with abnormal right hemodynamics (right ventricular volume overload) (6,22,34). But the septal motion has not been studied systematically in patients with abnormal left heart hemodynamics i.e. left ventricular diseases. As the septum contributes significantly to left ventricular ejection, so echocardiogram might demonstrate abnormal modes of septal motion as that seen on angiography in patients with ventricular dysfunction.

AIM OF WORK

The Aim of the Work:

The present study was designed to evaluate the degree of alteration in septal motion and thickness as a result of disturbance in left ventricular hemodynamics, and function in different valvular heart disease either producing increase volume or pressure overload.

In this study the echocardiogram was done for patients with isolated mitral and aortic valve disease, for evaluation of the pattern of motion and thickness of interventricular septum, and for normal volunteer subjects. The echocardiograms were obtained in 50 patients, ten of them were normal subjects, ten with isolated mitral stenosis, ten with isolated mitral regurgitation, ten with isolated valvular aortic stenosis and ten with aortic regurgitation.

The interventricular septal motion and thickness were studied in every case in systole and diastole.

ANATOMY

ANATOMY

The interventricular septum is a developmentally heterogenous structure which separates the cavities of the right and left ventricles. It is composed of two distinctive portions (42).

1- Membranous septum

This is continuous with the interatrial septum, the A-V valve ring, aortic and pulmonary trunks. It is a part of the fibrous skeleton of the heart. Also it is the last portion of the septum to close during embryonic development.

2- Muscular septum

This comprises the remainder and the main bulk of interventricular septum, it separates the main chambre of the right and left ventricles.

In neonates and younger children, the interventricular septum lies parallel to the anterior chest wall, because the right ventricle is dilated and lies directly anterior to the left ventricle. In older children and in adults, the lower muscular portion of interventricular septum lies in plane 35 degrees to the left of midline.

The right surface of the septum is overlaid with heavy trabeculations, the largest of which is the moderator band. Trabeculations of the left septal surface are generally flat and smooth.

Conal Septum

"Crista supra ventricularis or Partial septum"

This lies at an angle of 65 degrees to the right of the midline. The conal septum, which together with the infundibulum free wall separates the pulmonary valve from the body of the right ventricle, is actually a derivative from the embryonic conotruncal segment and is therefore not a part of the interventricular septum in its strictest definition (74).

Blood supply of the interventricular septum:

This is divided into:

1- The anterior portion of the septum derives its blood supply from perforating branches of the anterior descending coronary artery.

2- The posterior portion of the septum is supplied by either:

1- Posterior descending artery which is a branch

of the right coronary artery (common).

2- Or by both circumflex and right coronary arteries.

3- Or by circumflex artery alone.

Relation between the Conductive System and the Septum

The septum houses portions of the cardiac conduction system. The lower A-V node and bundle of His are in the membranous septum, extending into the upper part of the muscular septum.

The common bundle divides into the right and the left branches, which course along the subendocardial surfaces of each side of the septum.

Normal electrical depolarization of the septum is initiated from the left bundle branch system with the wave of depolarization extending from left to right across the septum. The septum is the first portion of the ventricle to contract in ventricular systole.

NORMAL ECHO FEATURES OF INTERVENTRICULAR SEPTAL MOTION

Normal Echo Features of Interventricular Septal Motion

The interventricular septum is unique in that:

1- It is a wall common to both ventricles.

2- And its motion is uninhibited by the pericardium.

The pattern of motion is seen by M.mode echo, where the transducer is placed on the chest wall along the left sternal border and directed posteriorly through the left ventricle where the ultrasonic beam transects the interventricular septum (Fig. 1).

The interventricular septum is characterized qualitatively by its motion and its position relative to other intracardiac structures, and quantitatively by its thickness, so the septum (membranous and muscular portions) must be viewed perpendicularly and its full length (from the aortic root to the left ventricular apex) must be scanned.

The septum lies between relatively echo-free spaces of the right and left ventricular cavities.