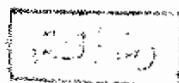


**NON-INVASIVE ASSESSMENT OF LEFT
VENTRICULAR HYPERTROPHY AND
LEFT VENTRICULAR DIASTOLIC
FUNCTIONS IN PATIENTS WITH
ISOLATED AORTIC STENOSIS**

Thesis



Submitted in partial fulfilment of master degree in
pediatrics

by

53944

Yasser Mohamed Mohamed Hassan

M.B., B.Ch

Supervisors

Prof. Dr. Magid Ashraf A. F. Ibrahim

Professor of Pediatrics
Ain Shams University

[Handwritten signature]
[Handwritten signature]

Dr. Tarek Ahmed Abd El Gawad

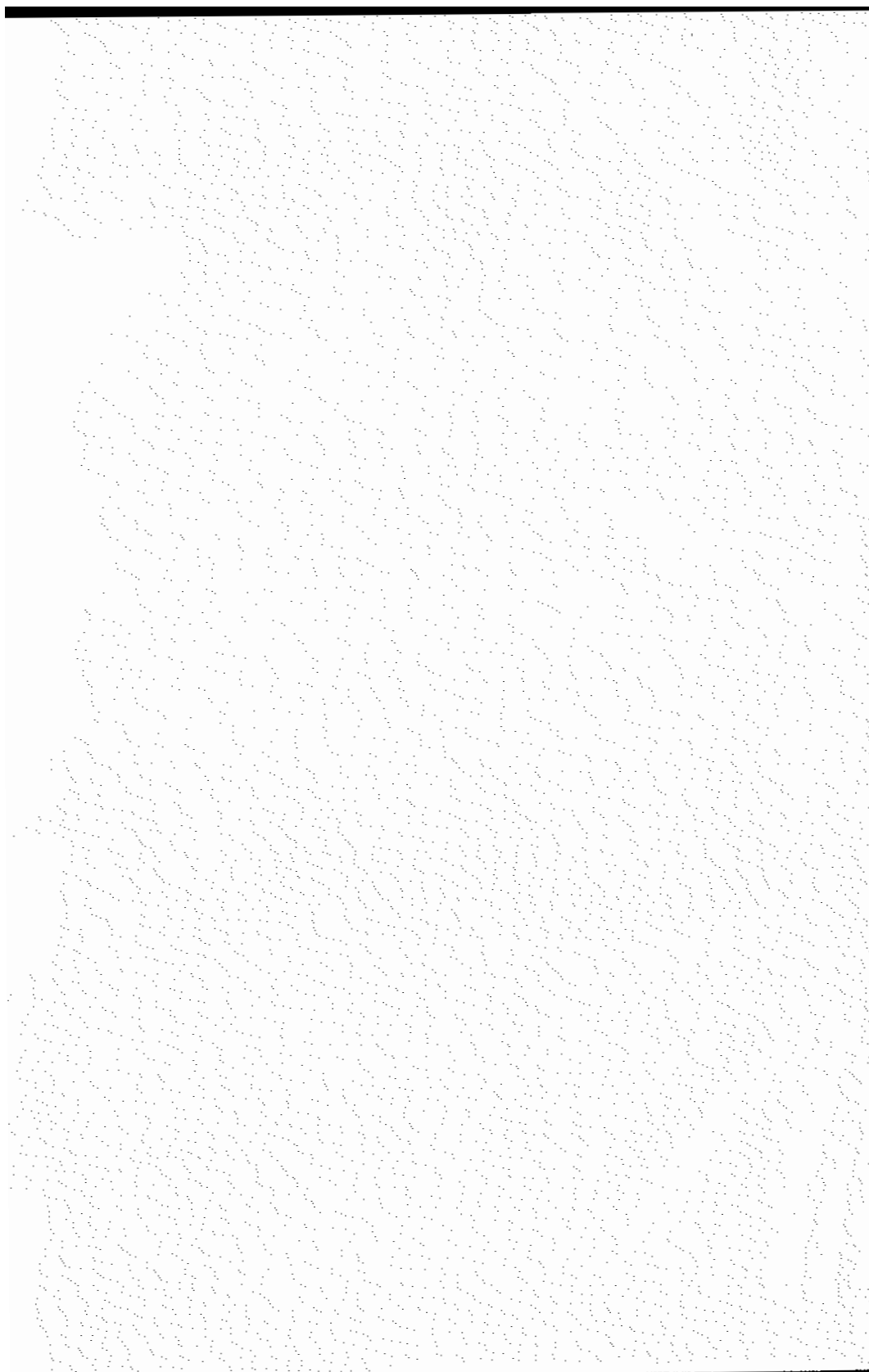
Ass. Profesor of Pediatrics
Ain Shams University

618.92125

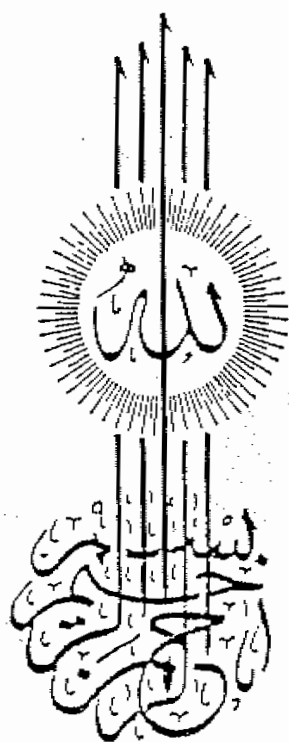
J.M

**Faculty of Medicine
Ain Shams University
1996**



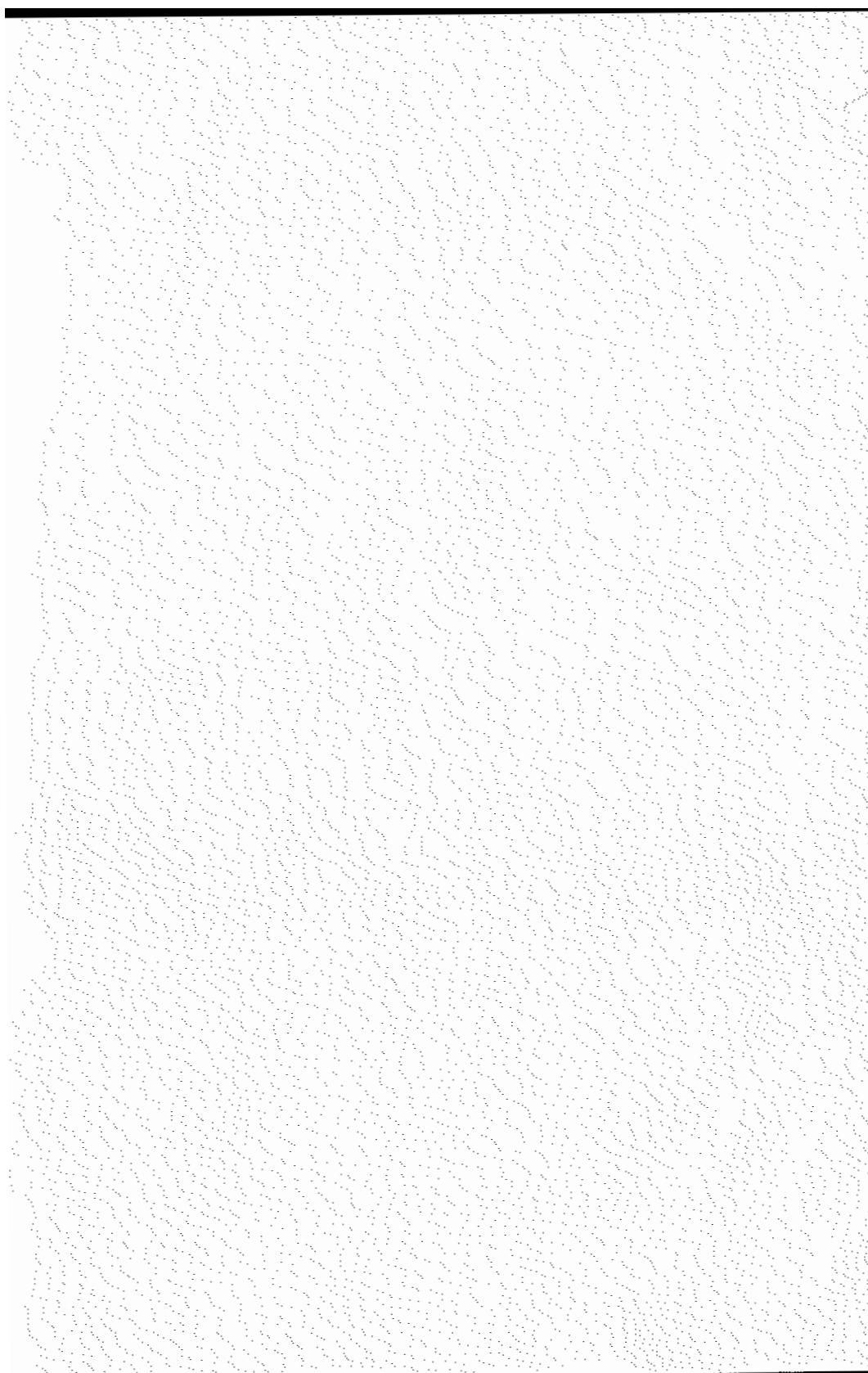






﴿ وَعَلِمَكَ مَا لَمْ تَكُن تَعْلَمُ ﴾
وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا ﴿

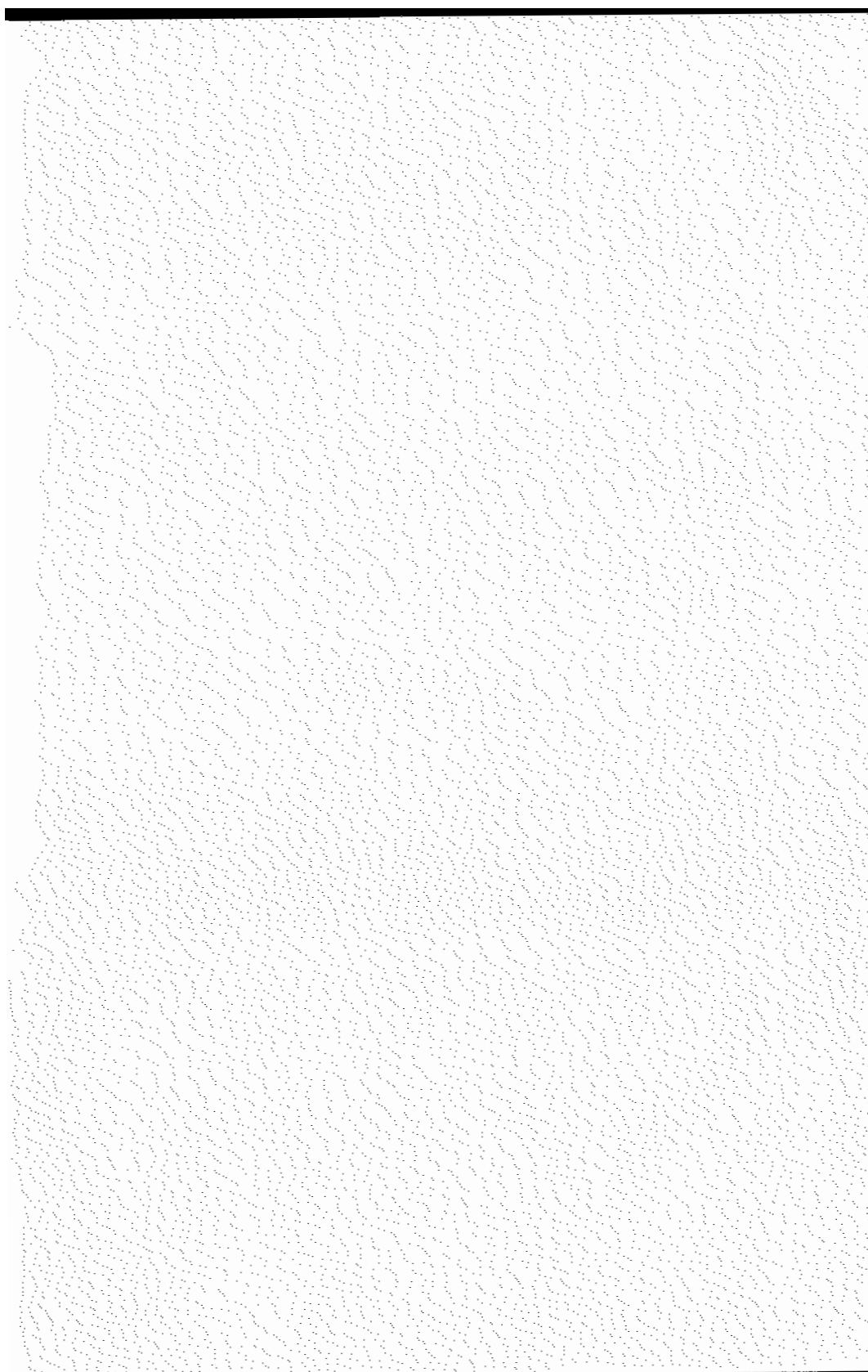
صدق الله العظيم [النساء ١١٣]



Acknowledgment

It is with great honor that I take this opportunity to record my appreciation to Prof. Dr. Magid Ashraf A. F. Ibrahim Professor of Pediatrics, Faculty of medicine, Ain - Shams University, whose suggestions, and meticulous supervision have been of inestimable value in the preparation of this thesis.

I am also, greatly indebted to Dr. Tarek A. Abd El-Gawad, Ass. Professor of Pediatrics, Faculty of medicine, Ain - Shams University, for his generous advice, encouragement and follow-up every detail of the work. His bright opinions, reverent aid and support were of great help to me in putting this work in its kind formaton.



CONTENTS

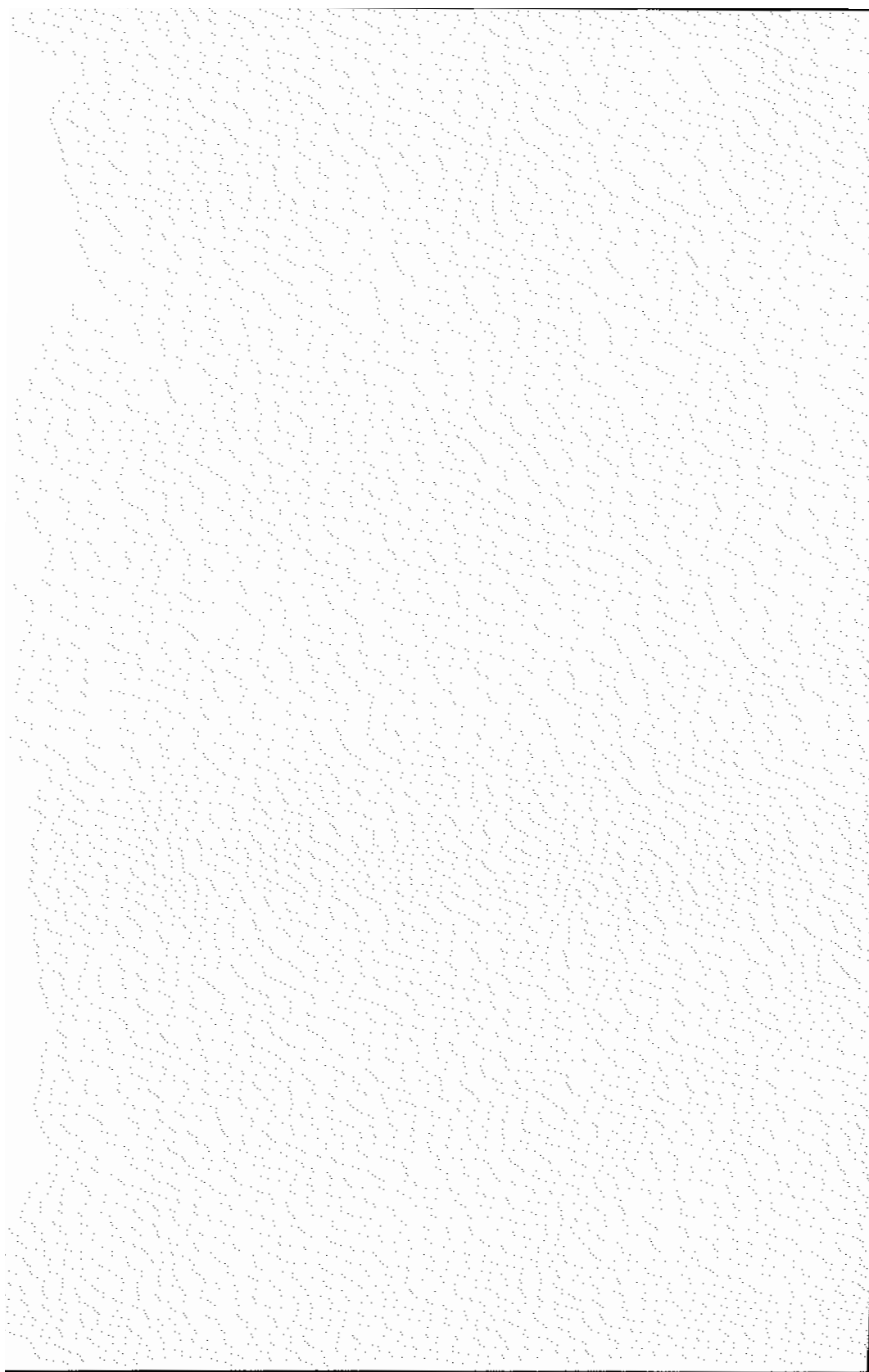
	Page
Introduction & Aim of the Work	1
Review of Literature	3
Definition	3
Incidence and presalence	3
Asspiciated cardio vascular anomalier	4
Etiology	5
I - Congenit aortic stenosis	6
a - Valvular aortic stenosis	7
b - Subvalvular aortic stenosis	11
c - Supravalvular aortic stenosis	12
II - Acquired aortic stenosis	13
a - Rheumatic aortic stenosis	13
b - Degenerative aortic stenosis	13
III - Miscellaneous types of aortic stenosis	14
Pathophysiology	14
Manifistations of aortic stenosis	18
Radiologica diagnosis of left ventricular hypertrophy ...	30
The electrocardiogram	34
Criteria for left ventricular hypertrophy in pediatrics (summary)	40
Factors affecting ECG criteria for left ventricular hypertrophy.....	41
Echocardiography	42
- Echocardiography in aortic stenosis.....	57
- Echocardiographic diagnosis of left ventricular hypertrophy.....	60
- Estimation of left ventricular mass by M- mode echocardiography.....	61
Diastolic dysfunction in aortic stenosis	66
Pathophysiology	66
Incidence and diagnosis.....	67
Therapy of diastolic dysfunction.....	70

CONTENTS

	Page
Treatment of aortic stenosis	72
Subjects & Methods	74
results	83
Discussion	108
Summary & conclusion	116
Recommendations	120
References	121
Arabic summary	144

List of Tables

	Page
Table (1) :Congenitally abnormal aortic ^{valves} evalues	5
Tabel (2) :Clinical identification of patients with left ventricular hypertrophy	84
Table (3) :Electrocardiographic classification of left ventricular hypertrophy according to maximum amplitude of any of the limb leads	86
Table (4) :Electrocardiographic classification of left ventricular hypertrophy according to sum of chest leads $RV_6 + SV_1$	87
Table (5) :Comparison between group I (normal LV) and group II (concentric left ventricular hypertrophy)	89
Table (6) :Comparison between group I (normal LV) and group III (concentric remodeling).	90
Table (7): Pulsed Doppler recordings of diastolic transmitral flow velocity	95
Table (8) :Anthropometric measurements of all patients..	101
Table (9) :Garson ECG table (summary of normal values).....	102
Table (10) :Electrocardiographic findings and X-ray measurement of all patients.	103
Table (11) :Normal Echocardiographic values for children	106
Table (12) :Echocardiographic findings in all patients ...	107



List of Figures

	Page
Fig. (1): Diagram of normal aortic valve	6
Fig. (2): Diagram of the two types of unicuspid aortic valves	8
Fig. (3) :The bicuspid aortic valve its types and complications	8
Fig. (4) : Schematic illustrations of various types of aortic valve stenosis	9
Fig. (5) : Facial appearance of two patients with Williams Syndrome	22
Fig. (6) : Brachial arterial pulses from a normal young adult and from three patients with aortic valve stenosis	23
Fig. (7) : The arterial pulses in various types of aortic stenosis	23
Fig. (8) : Jugular venous pulse in sever aortic stenosis	25
Fig. (9) : Illustrations of auscultatory signs of mild, moderate and sever aortic stenosis	28
Fig. (10) : Illustration of plain X-ray film measurement frontal view	31
Fig. (11) : Illustration of plain X-ray film measurements lateral view	32
Fig. (12) : Diagram showing spatial relations of six extremity (frontal plane) leads	36
Fig. (13) : Diagram showing spatial relations of six (horizontal plane) leads.	36
Fig. (14) : M-mode cursor superimposed over a two-dimensional echo representing the location of M-mode sampling	43

List of Figures

	Page
Fig. (15) : The position of the four primary echocardiographic windows in relation to the thoracic cage and underlying regions of the heart	45
Fig. (16) : Parasternal long axis view of the left heart	46
Fig. (17) : Parasternal short axis view of the left ventricle at the mitral valve level	47
Fig. (18) : Apical four chamber view	48
Fig. (19) : The image plane in the subcostal long axis view of the heart	49
Fig. (20) : The image plane in the suprasternal long axis of the aortic arch.	50
Fig. (21) : Pulsed wave Doppler	52
Fig. (22) : Continuous wave Doppler	53
Fig. (23) : Normal color flow mapping for cardiac imaging	55
Fig. (24) : Parasternal long axis recording from a patient with aortic stenosis	58
Fig. (25) : Continuous wave Doppler recording of aortic stenosis	59
Fig. (26) : Example of normal mitral inflow pattern recorded from the cardiac apex	68
Fig. (27) : Example of abnormal transmitral flow velocity profile	69
Fig. (28) : ECG recording of patients in the study	97
Fig. (29) : Echo recording of patients in the study	99

List of Abbreviations

A point	Atrial peak filling velocity
AS	Aortic stenosis
ASE	The American Society of Echocardiography
BSA	Body surface area
CSA	Cross section area
CVH	Combined ventricular hypertrophy
ECG	Electrocardiogram
Echo	Echocardiography
Ej Fr	Ejection fraction
E point	Early peak filling velocity
Fs	Fractional shortening
Hr	Heart rate
LA	Left atrium
LCA	Left carotid artery
LPL	Left precordial leads
LSA	Left subclavian artery
LV	Left ventricle
LVH	Left ventricular hypertrophy
LVEDD	Left ventricular and diastolic dimension
LVES	Left ventricular end systole
LVESD	Left ventricular end systolic dimension
LVIDD	Left ventricular internal dimension in diastole
LVIDS	Left ventricular internal dimension in systole
LVH	Left ventricular hypertrophy
LVM	Left ventricular mass
LVMI	Left ventricular mass index

List of Abbreviations

LVMl	Left ventricular mass index
PWT	Posterior wall thickness
PWTD	Posterior wall thickness diameter
RA	Right atrium
RV	Right ventricle
RVH	Right ventricular hypertrophy
RVID	Right ventricular internal dimension
RWT	Relative wall thickness
RWTD	Relative wall thickness diameter
S/P	Septal to posterior wall thickness ratio
SWT	Septal wall thickness
SWTD	Septal wall thickness diameter
TEE	Transesophageal echocardiography
ULN	Upper limit of normal