MAGNETIC RESONANCE IMAGING OF CONGENITAL ANOMALIES OF THE HEART AND THORACIC GREAT VESSELS

Basay

Submitted for partial fulfillment of Master Degree in **Radiodiagnosis**

Ву

Naglaa Hussein Ahmed Shebriah

 $\mathcal{M}.\mathcal{B}.,\mathcal{B}.\mathcal{Ch}.$

58315

Supervised By

Prof. Dr. Zeinab Mohamed Abdallah

Prof. and Chairman of Radiodiagnosis Dept.

Faculty of Medicine

Ain Shams University

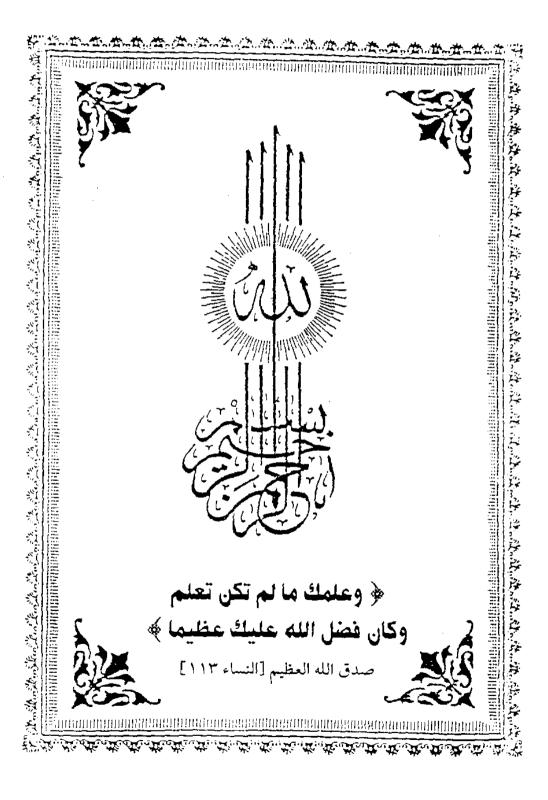
Dr. Hanan Mohamad Eissa

Lecturer of Radiodiagnosis
Faculty of Medicine
Ain Shams University

PACULTY OF MEDICINE
AIN SHAMS UNIVERSITY
1996







TO MY FAMILY

Les diales of the stand of the

ACKNOWLEDGEMENT

I would like to express my profound and sincere gratitude to Professor Dr. Zeinab Mohamad Abdalla, Prof. and Chairman of Radiodiagnosis department, Ain Shams University, for giving me the honour to work under her supervision and for her kind guidance and generous help and valuable directions that made this work possible.

I was fortunate to carry out this work under the guidance of Dr. Hanan Mohamad Eissa, Lecturer of Radiodiagnosis, Ain Shams University, who offered me much of her time and experience.

My deepest appreciation goes to **Professor Dr.** Hoda El Deeb, Professor of Radiodiagnosis, Ain Shams University, and Chairman of MR Unit at Ain Shams Specialized Hosptial, who offered me a great help along the way.

Finally, I would like to thank all members of the MR Unit, my professors, senior staff and collegaues at Radiology Department, Ain Shams University for their favourable assistance and kindness.



CONTENTS

| I. | Introduction and aim of work | Page 1 |
|-------|--|-----------|
| II. | Normal anatomy of the heart and thoracic great vessels | 2 |
| II. | pathology | 26 |
| IV. | Technique of MR examination and normal magnetic resonance (MR) appearance of the heart and thoracic great vessels. | 62 |
| V. | MR manifestations of congenital anomalies of the heart and thoracic great vessels. | 112 |
| VI. | Summary and conclusion | 168 |
| VII. | references | 172 |
| VIII. | Arabic summary | |



LIST OF FIGURES

| | | Page |
|---------|---|------|
| Fig. 1 | Primitive heart tube | 3 |
| Fig. 2 | Formation of the cardiac loop | 4 |
| Fig. 3 | Remodeling of venous flow to the heart | 5 |
| Fig. 4 | Differentiation of the primitive atrium | 6 |
| Fig. 5 | Foetal septation of the atria | 7 |
| Fig. 6 | Realignment of the heart | 10 |
| Fig. 7 | Development of the normal aortic arch | 11 |
| | and its branches | |
| Fig. 8 | Interior of the right atrium | 13 |
| Fig. 9 | The atrial appendages | 14 |
| Fig. 10 | Interior of the right ventricle | 16 |
| Fig. 11 | Interventricular septum | 17 |
| Fig. 12 | Interior of left ventricle | 19 |
| Fig. 13 | The AV orifices | 19 |
| Fig. 14 | Heart and great vessels. Sternocostal | 21 |
| | aspect | |
| Fig. 15 | Heart and great vessels. Posterior aspect | 21 |
| Fig. 16 | Relationship of pulmonary arteries to the | 25 |
| | bronchial tree | |
| Fig. 17 | Atrial septal defects | 31 |
| Fig. 18 | Atrioventricular septal defect | 33 |
| Fig. 19 | Ventricular septal defects | 34 |
| Fig. 20 | Fallot's tetralogy | 38 |
| Fig. 21 | Total anomalous pulmonary venous | 42 |
| | connection | |
| Fig. 22 | Types of truncus arteriosus | 44 |

LIST OF FIGURES (CONT.)

| Fig. 23 | Relation of aortic to pulmonary valve | 47 |
|----------|--|---------|
| Fig. 25 | Uncorrected transposition of great | 48 |
| | arteries | |
| Fig. 26 | Corrected transposition of great arteries. | 49 |
| Fig. 27 | Atrial morphology | 51 |
| Fig. 28 | Ebstein's malformation | 53 |
| Fig. 29 | Right aortic arch with aberrant origin of | 55 |
| | left subclavian artery. | |
| Fig. 30 | Double aortic arch | 56 |
| Fig. 31 | Pulmonary artery sling | 58 |
| Fig. 32 | Persistent left superior vena cava | 60 |
| Fig. 33 | Spin-echo multislice sequence | 75 |
| Fig. 34 | Cycled multislice multiphase technique. | 75 |
| Fig. 35 | ECG triggered execution of fast GE | 78 |
| Fig. 36 | Fast GE multislice technique | 78 |
| Fig. 37 | Standard orthogonal orientations | 81 |
| Fig. 38 | Variation in projected transverse image | 83 |
| Fig. 39 | Oblique MR imaging orientations. | 84 |
| Fig. 40 | Oblique sagittal plane for thoracic aorta | 86 |
| Fig. 41 | Coronal oblique plane for pulmonary | 86 |
| | arteries | |
| Fig. 42- | Tranaxial plane | 94-101 |
| 49 | | |
| Fig. 50- | Sagittal plane | 102-104 |
| 52 | | |
| Fig. 53- | Coronal plane | 105-107 |
| 55 | | |

