



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
على هذه الأفلام قد أعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of  
15-25- c and relative humidity 20-40%

بعض الوثائق  
الأصلية تالفه

بالرسالة صفحات  
لم ترد بالأصل

# *Spiral CT Angiography in Renal Artery Stenosis*

*Essay submitted for partial fulfillment of the  
Master Degree in Radiodiagnosis*

Presented by  
**RANIA MOHAB EL-MARZOUKI**  
*M.B., B.Ph., Ain Shams*

Under the supervision of

PROF. DR. **AIDA MOHAMED EL-SHIBINY**

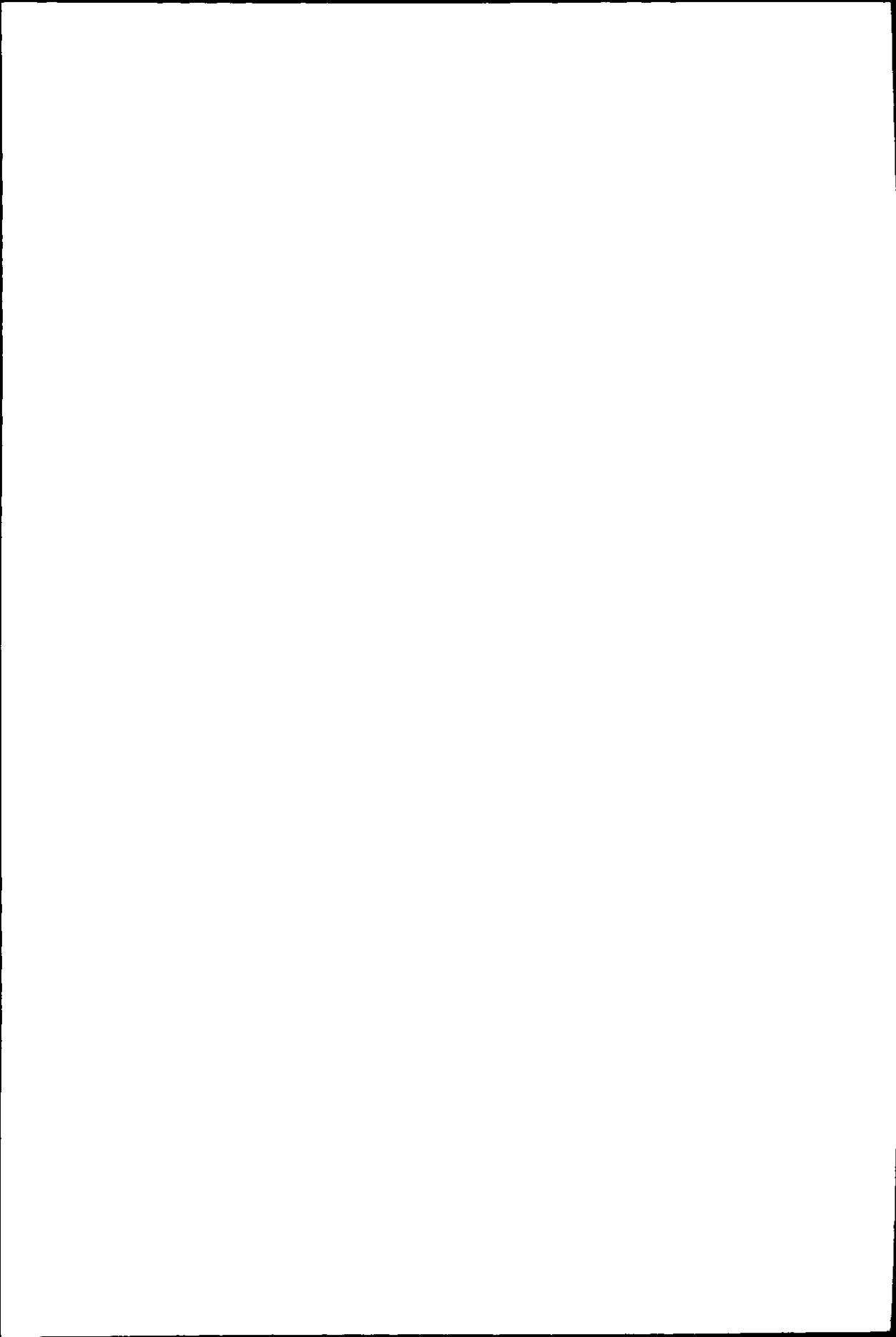
*Assistant Professor of Radiodiagnosis  
Faculty of Medicine-Ain Shams University*

DR. **SAFAA KAMAL MOHAMED**

*Lecturer of Radiodiagnosis  
Faculty of Medicine-Ain Shams University*

**Faculty of Medicine  
Ain Shams University  
1999**

799  
CP



بسم الله الرحمن الرحيم

**" قالوا سبحانك لا علم لنا**

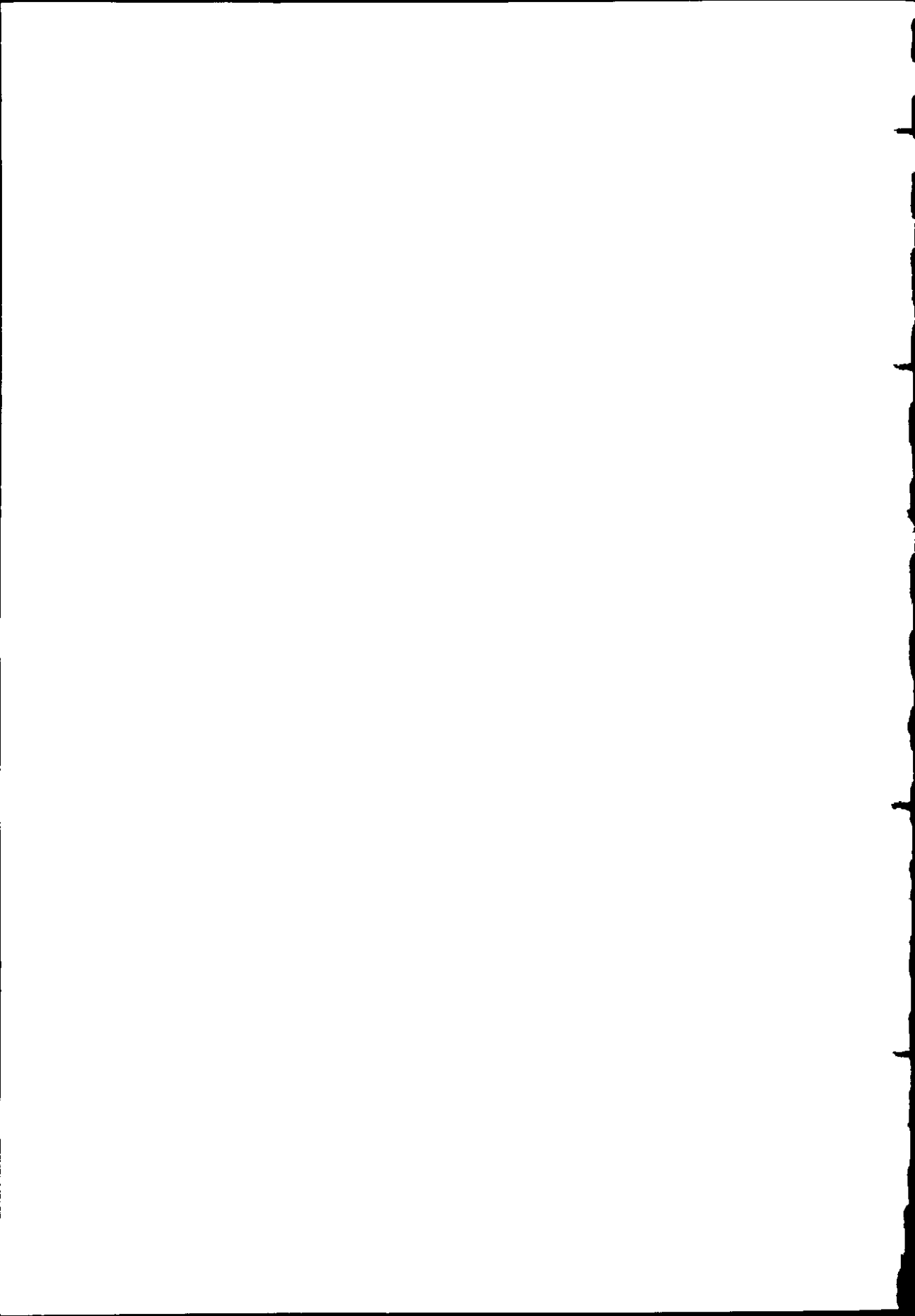
**إلا ما علمتنا أنك أنت**

**العليم الحكيم "**

صدق الله العظيم

(سورة البقرة الآية ٣٢)





## *Acknowledgment*

*Thanks to God who allowed me to accomplish this work.*

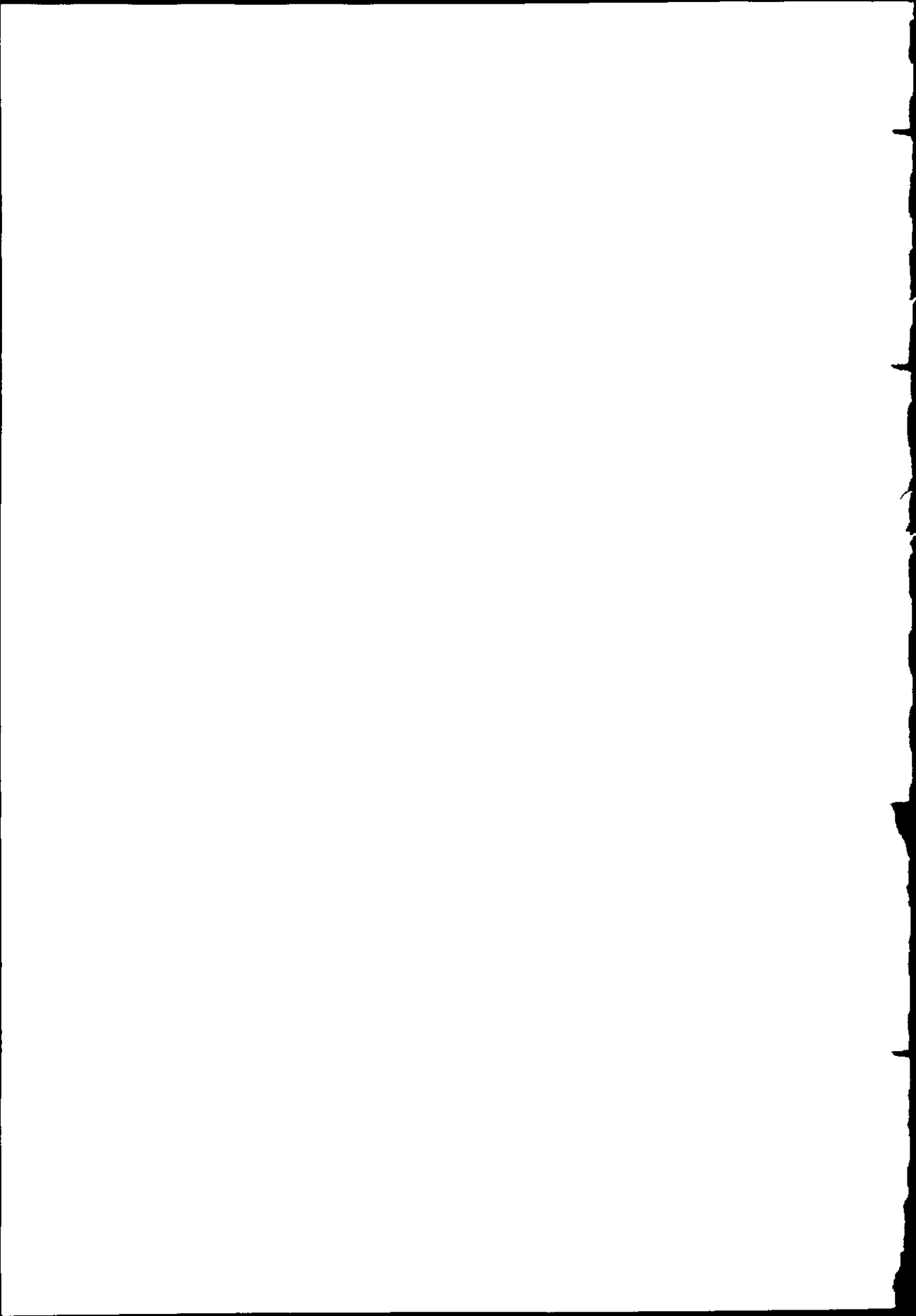
*It is an honor to express my respect and love to my Prof. Dr. Aida Mohamed El-Shibiny, Assistant Professor of Radiodiagnosis, Ain Shams University, for her great help, valuable advice and kind encouragement. Her intellectual and constructive opinions were essential to dress this work in its final form.*

*I wish to give many thanks to Dr., Safaa Kamal Mohamed, Lecturer of Radiodiagnosis, Ain Shams University, for her willing assistance and guidance throughout the steps of this work. Her honest help, constant advice and keen interest were the hallmarks of the completion of this work.*

*Last but not least, I want to thank my parents for their support and encouragement throughout my whole practical life.*

*Rania Mohab El-Marzouki*

*1999*



# *List of Contents*

	<b>Page No.</b>
<i>Introduction and Aim of the Work</i>	1
Chapter I: Anatomy of the Kidneys and Renal Arteries	2
Chapter II: Pathology of Renal Artery Stenosis	11
Chapter III: Technical Principles of Spiral CT	17
Chapter IV: Spiral CT Angiography in Renal Artery Stenosis	31
Chapter V: Other Modalities for Detection of Renal Artery Stenosis	52
<i>Discussion</i>	73
<i>Summary and Conclusion</i>	77
<i>References</i>	79
<i>Arabic Summary</i>	



# List of Figures

	<i>Page No.</i>
<i>Figure (1): The structural and functional organization of the kidney.</i>	3
<i>Figure (2): The aorta and its branches.</i>	4
<i>Figure (3): Relations of renal arteries.</i>	5
<i>Figure (4): Segmental branches of renal artery.</i>	6
<i>Figure (5): Segmental circulation of the kidney.</i>	7
<i>Figure (6): Intrarenal arterial anatomy.</i>	8
<i>Figure (7): Venous drainage of the kidney.</i>	9
<i>Figure (8): Inferior vena cava and its tributaries.</i>	10
<i>Figure (9): Schematic drawing of the scanning geometry used in spiral CT.</i>	18
<i>Figure (10): Schematic of interpolation rational for helical CT.</i>	18
<i>Figure (11): Single versus multiple helical scans.</i>	20
<i>Figure (12): Aortic aneurysm a) MIP and b) SSD aortic aneurysm with calcification and thrombus.</i>	26
<i>Figure (13): Axial CT sections show triple renal arterial supply.</i>	33
<i>Figure (14): Right renal artery stenosis in axial section.</i>	33
<i>Figure (15): Curved reformatted images show plaques at the origin of the right renal artery.</i>	34
<i>Figure (16): a) SSD b) MIP CT angiograms c) contrast angiograph in bilateral renal artery stenosis.</i>	36

<i>Figure (17): Normal renal arteries shown by a) axial b) SSD c) MIP d) and e) multiplanar reformations f) contrast angiography</i>	37-38
<i>Figure (18): b) SSD c) MIP d&amp;e) multiplanar reformations f) angiography showing bilateral renal artery stenosis.</i>	39-40
<i>Figure (19): a) MIP b) SSD CT angiograms showing nephrogenic size discrepancy associating RAS.</i>	41
<i>Figure (20): MIP CT angiogram showing stenosis in left accessory renal artery.</i>	42
<i>Figure (21): a) Axial CT scans showing aortic calcification; b) coronal reformatted images diagnose stenosis of right renal artery c) DSA confirm the diagnosis.</i>	43
<i>Figure (22): Left renal artery stenosis with calcification seen with b) MIP c) multiplanar reformats and not with a) SSD</i>	44
<i>Figure (23): Schematic representation of ostial (a), truncal (b) and pseudotruncal (c) stenosis.</i>	45
<i>Figure (24): a) DSA (truncal stenosis) b) CT angiogram showing ostial stenosis.</i>	47
<i>Figure (25): a) DSA narrowing of right renal artery; b) spiral CT angiogram reveals infundibular dilatation of the aorta.</i>	47
<i>Figure (26): a) conventional angiogram; b) SSD CT angio in aortic dissection.</i>	48
<i>Figure (27): a) angiogram; b) SSD CT angiogram; c) MIP CT angio showing bilateral renal artery stenosis in Takayasu's arteritis.</i>	49
<i>Figure (28): Conventional angiogram shows high origin of left renal artery.</i>	50