QUANTITATIVE CORONARY PLAQUE CHARACTERIZATION WITH MULTIDETECTOR CT ANGIOGRAPHY

Thesis

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Presented by

Shaimaa Salah Mohamed Abdelrazik

(M.B., B.Ch) M.Sc, (Radiodiagnosis)

Supervised by

Prof. Dr. Ahmed Mostafa Mohamed

Professor of Radiodiagnosis

Faculty of Medicine, Ain Shams University

Prof. Dr. Amir Louis Loka

Assistant Professor of Radiodiagnosis

Faculty of Medicine, Ain Shams University

Dr. Ali Hagag Ali

Lecturer of Radiodiagnosis

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

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الطبيبة/ شيماء صلاح محمد عبد الرازق

بكالوريوس الطب و الجراحة- ماجستير الأشعة التشخيصية

تحت إشراف

أ.د/ أحمد مصطفي محمد

أستاذ الأشعة التشخيصية والتداخلية

كلية الطب- جامعة عين شمس

أ.د/ أمير لويس لوقا

أستاذ مساعد الأشعة التشخيصية والتداخلية

كلية الطب- جامعة عين شمس

د/ علي حجاج علي

مدرس الأشعة التشخيصية والتداخلية

كلية الطب- جامعة عين شمس

كلية الطب

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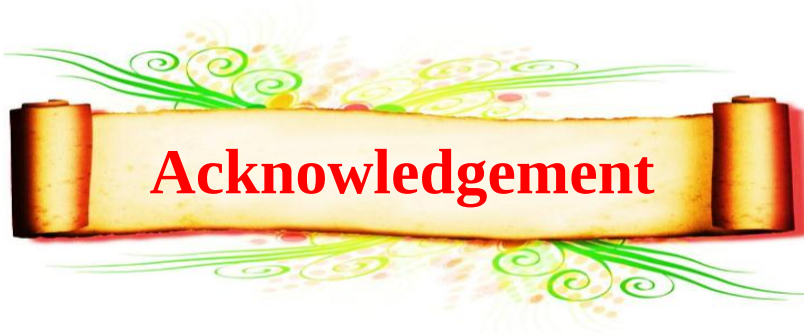

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Contents

Subjects	Page

- **List of Abbreviations ..... I**

List of table III

List of Figures IV

Introduction 1

Aim of the Work 5

Review of literature: .....

Chapter 1: Anatomy of Coronary Vessels 6

Chapter 2: Pathology of Atherosclerosis 24

Chapter 3: Coronary CT in atherosclerosis 31

Patients And Methods 49

Results 54

Cases 67

Discussion 76

Summary And Conclusion 84

References 86

Arabic Summary ..... -

List of Abbreviations

ACS	: Acute coronary syndromes
AHA	: American heart association
AOCA	: Anomalous origin of a coronary artery
AV	: Atrioventricular
CAAs	: Coronary artery anomalies
CAC	: Coronary artery Calcium
CABG	: Coronary artery bypass grafting
CAD	: Coronary artery disease
CCTA	: Coronary CT angiography
CTO	: Chronic Total Occlusions
ECG	: Electrocardiogram
HU	: Hounsfield units
ICA	: Invasive coronary angiography
IVUS	: Intravuscular ultrasound
IVUS-VH	: Ivus with virtual histology
LAD	: Left anterior descending
LCX	: Left circumflex artery
LDL	: Low-density lipoprotein
LMCA	: Left main coronary artery
LSV	: Lt sinus of vulsalva
MI	: Myocardial infarction
MPRs	: Multiplanner reformation
NCP	: Noncalcified plaques
OCT	: Optical coherence tomography
PCI	: Percutaneous coronary intervention
PSV	: Posterior sinus of valsalva

RCA	: Right coronary artery
RSV	: Right sinus of valsalva
SCD	: Sudden cardiac death
TCFA	Thin-capfibroatheroma
WL	: Window level
WW	Window width

List of Table

Tab. No.	*Subject*	*Page*
Table (1)	Classification of coronary artery anomalies	21
Table (2)	Population demographics and CAD risk factors by the presence or absence	54
Table (3)	Number of patients with significant coronary lesions	56
Table (4)	The prevalence of coronary plaque by age.	57
Table (5)	Gender and coronary vessel plaques	58
Table (6)	The number of vessel affection in diabetic/nondiabetic patients	60
Table (7)	Distribution of patients according to different Agatston scores	60
Table (8)	Gender and Agatston scoe range	62
Table (9)	Different types of plaques	62
Table (10)	Calcified plaques and their distribution among coronary vessels	62
Table (11)	Non-Calcified plaques and their distribution among vessels	63
Table (12)	Mixed plaques and their distribution among vessels	63
Table (13)	Plaque burden volumes of NCP and CCP by gender	64
Table (14)	Plaque burden volumes of NCP and CCP by age	65

List of Figures

Fig. No.	*Subject*	*Page*
Fig. (1)	Anatomy of the coronary arteries of the heart	6
Fig. (2)	Anatomy of coronary arteries 2D composite	9
Fig. (3)	Scheme of normal coronary anatomy	10
Fig. (4)	Volume render image showing the ramus intermedius branch (arrow), seen arising from the trifurcation	12
Fig. (5)	Coronary anatomy showing right/left dominance variants	13
Fig. (6)	Myocardial bridge: 54-year-old man with atypical chest pain	15
Fig. (7)	(A) Bridging morphological variations (length and depth), (B) Pathophysiological factors that exacerbate myocardial bridging	16
Fig. (8)	High take-off of RCA. Maximum intensity projection coronary CT angiogram	17
Fig. (9)	A: Shepherd's crook right coronary artery; B: Schematic representation	18
Fig. (10)	Left circumflex from the right sinus of Valsalva with posterior course	19
Fig. (11)	anomalous origination of RCA.	20
Fig. (12)	Anomalous coronary courses. Sagittal CT image showing the locations of the prepulmonic, interarterial, transseptal, and retroaortic coronary artery courses. The prepulmonic variant which is oftenly seen anterior to the right ventricular outflow tract.	23

Fig. No.	*Subject*	*Page*
Fig. (13)	Thin fibrous cap atheroma with thread like fibrous cap(arrow) separating necrotic core (NC) from lumen	27
Fig. (14)	Coronary artery with stable calcified atherosclerotic plaque, with thick fibrous cap	27
Fig. (15)	Drawings of the morphology of plaque development	30
Fig. (16)	coronary artery calcifications	33
Fig. (17)	Different patterns of Coronary Plaques by CCTA.	34
Fig. (18)	Multimodality imaging of obstructive coronary soft plaque	37
Fig. (19)	stenosis grading of CAD assessed by coronary CTA.	38
Fig. (20)	CCTA in a 57-year-old man with myocardial infarction, image of multiplanar reconstruction of LAD showing multiple black low-density areas	40
Fig. (21)	CT angiography plaque mapping, non-obstructive calcific plaque	41
Fig. (22)	CT angiography plaque mapping, obstructive soft tissue plaque	42
Fig. (23)	Invasive coronary angiography vs CCTA	43
Fig. (24)	Curved planar reformat demonstrates chronic total occlusion of approximately 30 mm length	47
Fig. (25)	Chronic total occlusion in CCTA.	48
Fig. (26)	Bar chart of the prevalence of coronary plaque distributed according to number of affected vessels	55
Fig. (27)	Bar chart representation of patients with positive risk factors.	59

Fig. No.	*Subject*	*Page*
Fig. (28)	Box plot representation of Agatston score range according to age group	61
Fig. (29)	Pie chart of percentage of coronary vessel affection	64
Fig. (30)	Pie chart of Patient`s treatment plan.	66
Fig. (31)	Case 1	68
Fig. (32)	Case 2	69
Fig. (33)	Case 3	70
Fig. (34)	Case 4	71
Fig. (35)	Case 5	72
Fig. (36)	Case 6	73
Fig. (37)	Case 7	74
Fig. (38)	Case 8	75

Introduction

INTRODUCTION

Cardiovascular disease is considered a main public health problem and is the most common cause of death among men and women. ***(Ilangkovan et al.,2018)***

Patients presenting to the emergency division with different causes of chest pain, it could be acute myocardial infarction (MI), non-ischaemic cardiac disease (aneurysm, dissection or pulmonary embolism) or non-cardiac disease (respiratory, oesophageal or musculoskeletal disorders). If the cause is unclear, such patients are defined as having non-specific chest pain ***(Ilangkovan et al.,2018)***.

For these patients, the exclusion of acute MI in the acute care setting does not exclude underlying coronary artery disease (CAD) or the associated risk of future cardiac attacks, as demonstrated by studies showing that 0.8%–2.1% of patients evaluated for MI and then discharged from emergency departments have an adverse cardiac outcome in the first 30 days after discharge ***(Ilangkovan et al.,2018).***

Patients who have symptoms concerning for ischemic heart, usually proceed to stress testing with or

without imaging to stratify risk and plan management. These noninvasive functional tests offer improved specificity to detect ischemia, however they have limited sensitivity to detect subclinical CAD. Thus, using a more sensitive test to detect CAD will enhance risk assessment and improve patient management**.** ***(Thomas et al.,2015)***

Coronary atherosclerosis is a progressive disease with episodic occurrence of destabilizing changes leading to plaque thrombosis and reorganization. So multiple lesions with different appearances can be present simultaneously in the same patient. ***(Pugliese et al.,2009)***

Invasive coronary angiography is considered the gold standard tool in diagnosing coronary artery disease as it provides excellent visualization of coronary lumen and a map of the coronary vessels. ***(Sun and Xu, 2014)***

However, it is inherently invasive technique and can only provide an outline of the coronary lumen but cannot demonstrate the complex nature of coronary lesions, which is the main cause for the association between the imaging findings and clinical picture. ***(Sun and Xu, 2014)***

IVUS and other similar imaging modalities are used to understand intracoronary plaques, and their composition,

however their use is limited because of the high costs and being invasive technique. It is important to noninvasively diagnose and analyse lesions at their early degrees, particularly in asymptomatic and low-risk patients, to improve the risk stratification without depending on invasive procedures. ***(Sun et al.,2014)***

The development of advanced CT scanners permits non-invasive coronary artery visualization with high diagnostic accuracy, reliable detection of lumen stenosis and plaque analysis. ***(Sun et al.,2014)***

Coronary computed tomography angiography (CCTA) has good correlation with IVUS in the quantitative plaque analysis***. (Sun,2017)***

It has been reported that almost two thirds of acute coronary events occur in noncritical lesions (those with less than 50% lumen stenosis), highlighting the necessity for imaging modalities to characterize plaque composition ***(Sun and Xu, 2014)***

The likeliness of a plaque to rupture and to subsequently cause vessel obstruction and myocardial infarction is known to be dependent on its composition. ***(Sudarski et al.,2013)***