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Recent Advances in Imaging of The Arterial System of The Head and Neck

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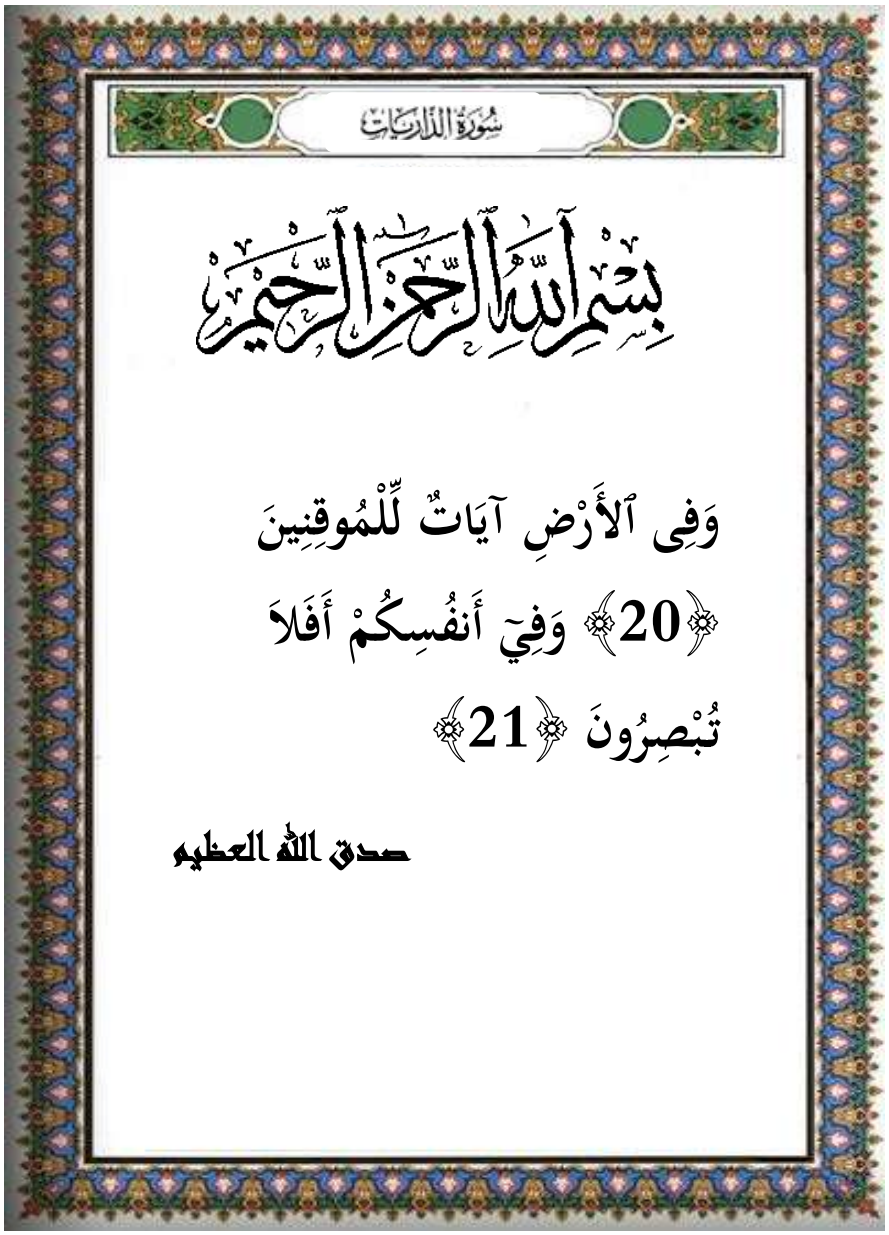
سورة الذاريات
بسم الله الرحمن الرحيم
وَفِى ٱلأَرْضِ آيَاتٌ لِّلْمُوقِنِينَ
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صدق الله العظيم

Dedication

To my father

Prof. Dr. Mohammed Refat Hussein Mahran

To my mother

Prof. Dr. Sanaa Mohammed Shafik Saleh Atta

To my lovely wife

Dr. Ghada Nabil Anwar Ganvdat

To Sara and Seif

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List of Abbreviations

2D	2-Dimentional
3D	3-Dimentional
ACA	Anterior Cerebral Artery
Aca	Anterior communicating artery
AICA	Anterior inferior cerebellar artery
AV	Arterio-Venous
AVM's	Arterio-Venous malformations
BA	Basilar artery
B-mode	Brightness mode
CCA	Common carotid artery
CEMRA	Contrast enhanced magnetic resonance Angiography
CMPR	Curved multiplannar reformation
CN	Cranial nerve
CRA	Central Retinal artery
CTA	Computed tomography angiography
CV	Cervical vertebra
DDB	Deep Descending branch
DSA	Digital subtraction angiography
DSCT	Spiral dual energy computed tomography
ECA	External carotid artery
EC-IC	Extra cranial –Intracranial
EDV	End diastolic volume
FR	French scale
ICA	Internal carotid artery
IV	Intravenous
LVA	Left vertebral artery
MCA	Middle cerebral artery
MDCTA	Multidetector computed tomography Angiography

List of Abbreviations (Cont.)

MIP	Maximal intensity projection
M-mode	Motion mode
MPR	Multiplannar reformation
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance imaging
OA	Occipital artery
PCA	Posterior communicating artery
Pc	Phase contrast
Pcoa	Posterior communicating artery
PICA	Posterior inferior cerebellar artery
PSV	Peak systolic volume
PW	Pulsed wave
RAH	Recurrent artery of Heubner
ROI	Region of interest
RVA	Right vertebral artery
SAH	Subarachnoid hemorrhage
SCA	Subclavian artery
SDB	Superficial descending branch
STA	Superficial temporal artery
T	Tesla
TIA	Transient ischemic attack
TOF	Time of flight
VA	Vertebral artery
VR	Volume rendering

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Introduction

Visualization of the arteries of the head and neck has been the concern of radiologists since lesions affecting them may lead to severe disabilities**.** The development of imaging techniques provided a full range of vision and enough data required to give a full description of the arterial status and the rate of blood flow. This facilitated the early diagnosis of some of the major vascular diseases such as atherosclerosis of carotid artery, carotid artery stenosis, stroke and cerebral infarcts ***(Patel, 2005).***

The conventional ultrasound is the safest modality utilized in visualization of arteries of the head and neck. It can be enhanced with Doppler measurement, to assess the patency of the vessel wall as well as the direction and velocity of blood flow within the vessel. However, the main disadvantage of ultrasound is that it may give false readings if used in a bony or a fatty area ***(Robertson and Baker, 2001).***

The gold standard technique in visualization of arteries is catheter based angiography which is operated by direct injection of a contrast material into aortic arch or selectively into either the carotid or the vertebral arteries, followed by its visualization by X-ray. This technique was modified by adding the digital subtraction to eliminate the overlying bone and produce a clear image. The disadvantages of the use of catheter include its invasiveness and the possibility of rupturing aneurysm or detaching a thrombus ***(Hiroshima et al., 2001).***

The above mentioned disadvantages of ultrasound and catheter angiography made it crucial to look for a new technique that can be used in evaluation of the blood flow in a minimally invasive way and capable of producing a clear image if used in a bony cavity such as the skull. This was accomplished by making use of Computed Tomography