ROLE OF DIFFERENT IMAGING MODALITIES IN THE DIAGNOSIS OF AORTIC DISSECTION

THESIS

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DEDICATION

This work is dedicated to my family:

to my parents who taught me

the very first and most valuable things in life,

for their continuous support, patience and encouragement.

Especial thanks to my brother, Victor, for his great

help and advice in the technical computer work.

بسم الله الرحمن الرحيم

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All the praise and adoration to God who gives wisdom to the wise and knowledge to the discerning. Thanks to God by whom we live, we move and we are found.

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2D	Two dimensional
3D	Three dimensional
A	Artery
AA	Ascending aorta
Ao	Aorta
AR	Aortic regurgitation
CR	Crown Rump
CT	Computerized tomography
DA	Descending aorta
DCE	dynamic gadolinium-enhanced
DSA	digital-subtraction angiography
FC	False channel
Fig.	Figure
GRE	gradient-recalled echo
I	Intimal flap
Lt	Left
LV	Left ventricle
MIP	maximum-intensity projection
MPR	multiplanar reformations
MR	Magnetic resonance
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
NVS	number of views per segment
Rt.	Right
TEE	transesophageal echocardiography
TL	True lumen
TR	repetition time
TTE	transthoracic echocardiography

INTRODUCTION

Aortic dissection is a life-threatening disease with a high mortality in the first hours. The diagnosis must be established as promptly as possible and a high index of suspicion is needed. Then a thorough evaluation of the patient is necessary for an adequate clinical decision making, *(San Roman et al., 1996)*.

The radiologic assessment of patients suspected of having an aortic aneurysm must be based on an understanding of the treatment options and how these are to be employed in any clinical setting. The diagnosis of dissection must be quickly confirmed *(Petasnick.1991)*. On the other hand, if left untreated, the disease is often rapidly fatal *(Anagnostopoulos et al.,1972)*.

Clinical diagnosis of Acute aortic dissection is not always easy as the condition may mimic many other diseases in their symptoms and signs including Myocardial infarction, Pericarditis, acute cholecystitis and inflammatory conditions involving costochondral region.

Although the plain radiographic findings are rarely diagnostic , a chest radiograph should be obtained in all patients suspected of having an aortic dissection. An abnormal chest radiograph may lend support to the diagnosis of aortic dissection.

After advent newly developed imaging modalities, diagnosis for aortic dissection had been extremely easier as compared with at the time when we had diagnosed this lesion solely by angiography *(Takamiya et al., 1996)*.

Aortic dissection may be imaged using different radiological modalities and techniques including radiography, aortography, magnetic resonance imaging, ultrasound and Each technique has unique advantages for initial diagnosis, confirmation and follow-up.

In recent years, ultrasound, computed tomography and magnetic resonance imaging have seen increased use for diagnosis of condition *(Dowd SB et al., 1996).*

Each modality will be evaluated according to its ability to enable correct diagnosis of the presence and extent of dissection as well as its role in treatment planning particularly when surgical intervention is contemplated.

Aim of work

The aim of work is to assess the role of different diagnostic radiological modalities in diagnosis of aortic dissection.

Embryology Of Aorta

Apart from the aortae none of the main vessels of the adult arise as single trunks in the embryo. Along the course of each vessel a capillary network is first laid down and by selection and enlargement of definite paths in this, the larger arteries and veins are defined. The branches of main arteries are not always simple modifications of the vessels of a capillary. network but arise as outgrowths from the enlarged stem.

As mentioned, subsequent to head fold formation each primitive aorta consists of ventral and dorsal parts which are continuous through the first embryonic aortic arch. The dorsal aortae run caudally, one on each side of the notochord, but in the fourth week they fuse from about the level of the fourth thoracic to that of the fourth lumbar segment to form a single definitive descending aorta. Although in many animals paired ventral aortae arise from the truncus arteriosus and course headwards on the ventral surface of the pharynx, in the human embryo the ventral aortae are fused and form a dilated aortic sac. the first aortic arches run through the mandibular arches, and caudal to them five additional pairs are developed within the corresponding branchial arches so that in all six pairs of aortic arches are formed *(Fig.1)*. the fifth arches are atypical and probably transient, at most, in mankind *(Collins P, 1995)*.

Caution should moderate unqualified use of the term *aortic arch (es)*. The embryonic arches are paired bilateral series joining the ventral aortae (or their fused expanded homologue) with the dorsal aorta of its side after traversing the core of a branchial arch. In contrast the definitive aorta consists of ascending aorta, aortic arch and descending (thoracic and abdominal) aorta-all parts of a single vessel in the mature state (but derived from multiple embryonic sources) *(Fig.1,2&3)* *(Collins P, 1995)*.

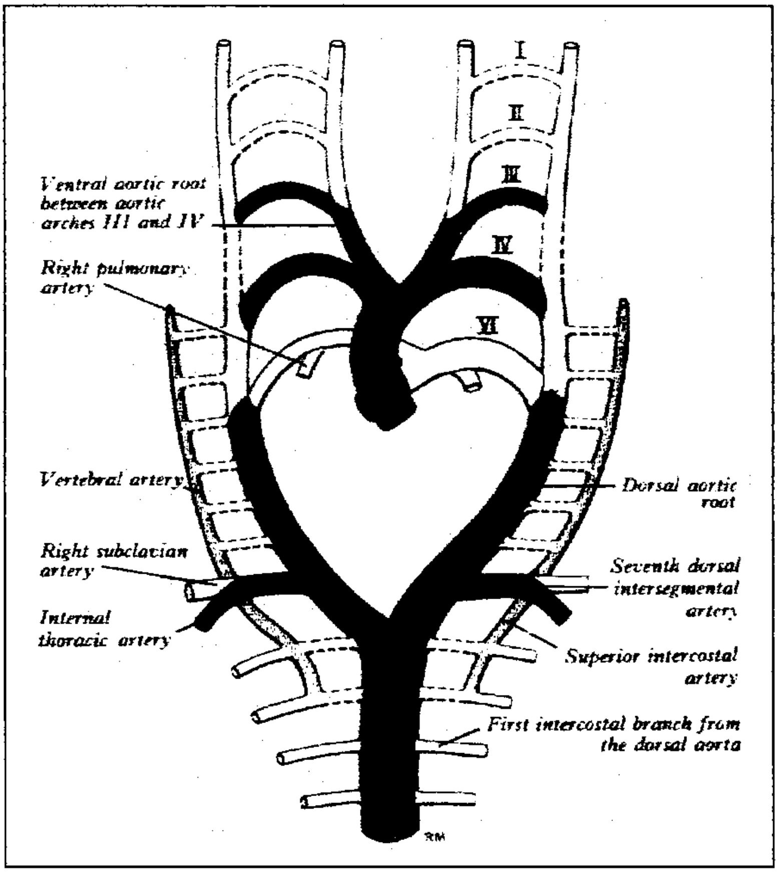
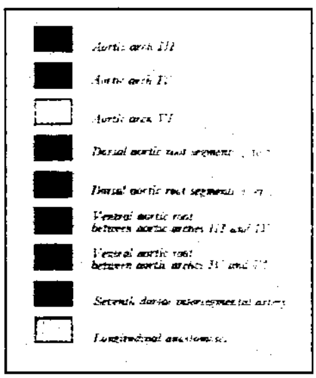


Fig.1 Schematic diagram showing the various components of the embryonic aortic arch complex in the human embryos. Interpreted lines indicate structures, which do not persist in normal development. Roman numerals refer to the branchial arches concerned, and Arabic numerals indicate the metameric body segments *(After Gray's, 1993)*



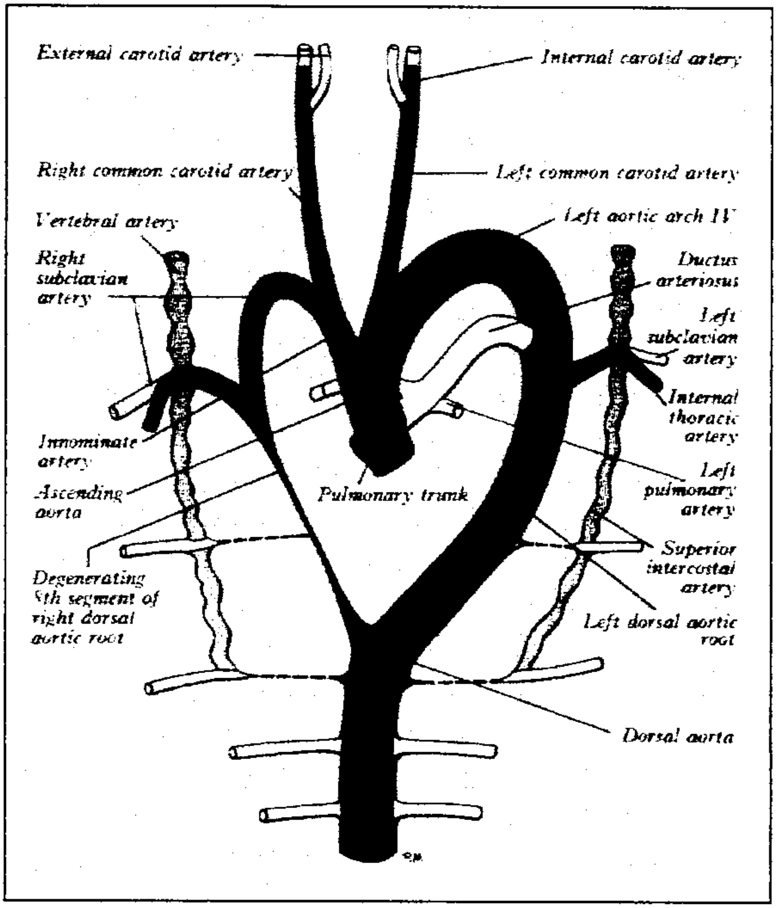


Fig.2 Diagrams of the adult human aorta and its branches viewed from the left ventrolateral aspect, showing the position and relative sizes of the definitive contributions from the various embryonic components shown in (Fig.1-A&B). *(After Gray's, 1993)*