MANAGEMENT OF ABDOMINAL AORTIC ANEURYSM

An Assay Submitted for The Partial Fulfilment

of the Master Degree in General Surgery

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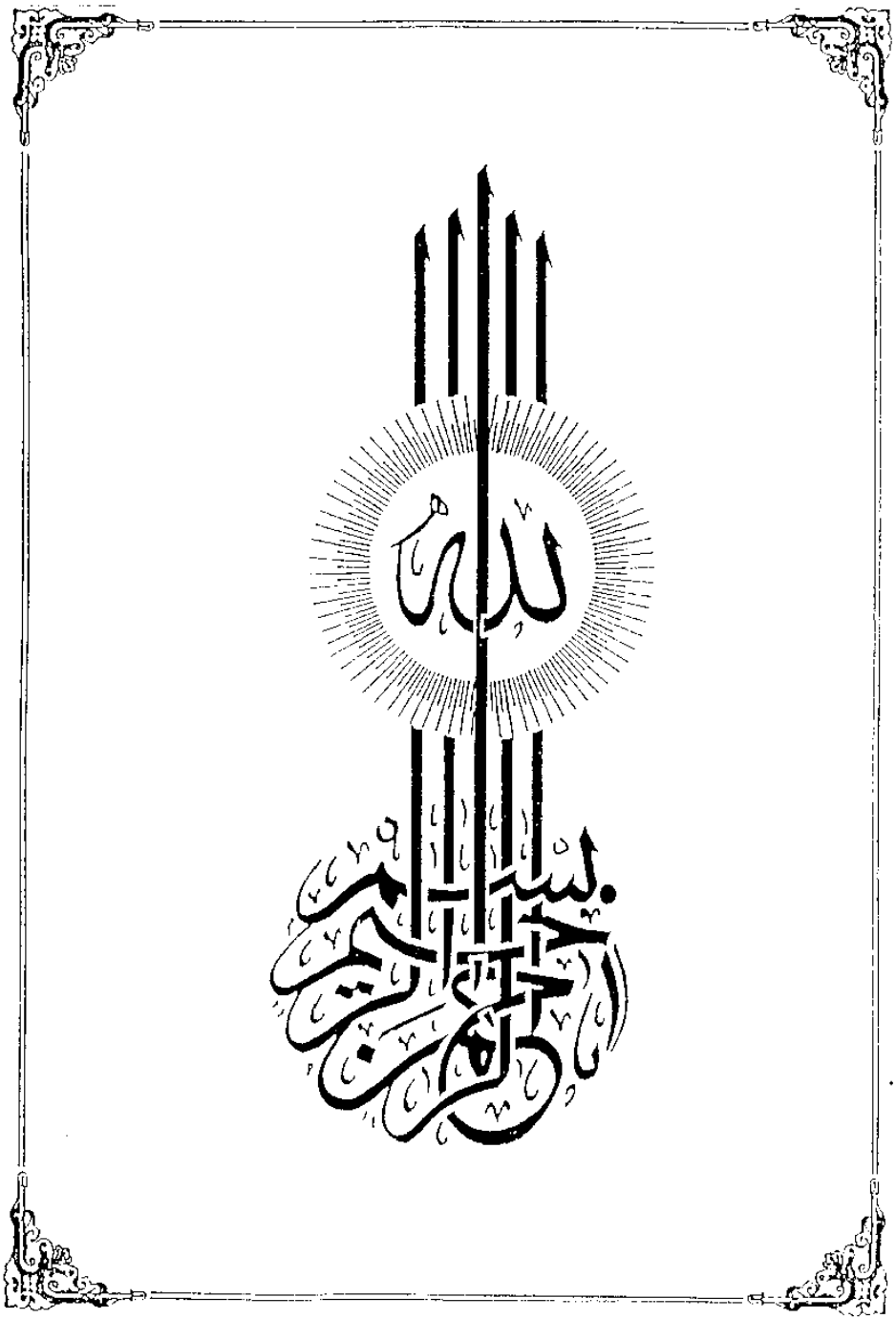

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INTRODUCTION

HISTORICAL BACKGROUND

- In the second Century Galen described an aneurysm as a localised swelling with pulsation, when wounded, bright blood spurtes with much violence.

- Four hundered years later, Aetius admitted this over whelming problem to surgical treatment when the aneurysm lies in the head or neck.

- William Hunter, 1757, had clarified the distinction between a true aneurysm and a false aneurysm. He also recognized bone erosion of the spine, thoracic cage, and skull, from aneurysmal presure.

- Home, (1786), understood the importance of local arterial disease in the causation and treatment of aneurysm of lower limb, and this led him to apply the high ligation method to the cure of popliteal aneurysm.

- Astly Cooper was the first to ligate human aorta, in 1817, placed a silk Ligature Just above the bifurcation in a man aged thirty-eight with a rapidly expanding left iliac aneurysm. He had already, in 1805 and 1808, ligated the common carotid for a similar condition in the neck [Brock, 1952].

- Reconstructive surgery for aneurysm, however, had to wait the control of sepsis over a century later, and the work of Guthrie (1912) on suture and grafting of vessels. Matas, in 1903 , performed endoaneurysmorrhaphy (Matas, 1903) with the maintenance in some cases of a lumen for the arterial blood flow.

- Graft replacemennt with saphenous vein was successfully, carried out by lexer of Jena in 1913, and by Hogarth Pringle in Glasgow, Later in the same year (Pringle, 1913).

- Moore and Corradi had introduced into the aneurysm a hollow insulated needle of a very fine calibre, through which is inserted a very fine silver or steel wire 3-25 cm long. Electrolysis is then performed through the wire using a galvanic current from 20 to 100 milli-amperes for about 1 hour. In other cases similar treatment has been employed without electric current being used, and colt has treated abdominal aneurysm in this way, introducing a fine gold wire, folded up into the form of a cage, which, when it is pushed down as hollow needle into the sac, expands automatically into an umbrella shape and provides a large wire surface in the sac for the blood to clot upon.

- Acupuncture or needling was a method of treatment employed by Sir William Macewen and consists of passing one or more

very sharp long needles into the aneurysmal sac at several points and inserting them till they just touch the opposite wall of the sac. They are left there for some hours, blood movement will cause them to ossilate, in order that their points may scratch and sacrify the lining of the sac. It is hoped that this will produce inflammation which will led to thickening of the wall of the sac and that when it is repeated many times a slow consolidation of the aneurysm may be encouraged, (quoted from the science and practice of surgery, 1944).

- The first successful excision of an abdominal aneurysm and replacement with an aortic homograft was by Dubost in 1951, ten years later many hundereds of successful cases had been reported from all over the world (Eastcott, 1969).

SURGICAL ANATOMY OF ABDOMINAL AORTA

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The descending thoracic aorta passes behind the diaphragm and appears in the abdomen between the crura of the diaphragm, on the front of Th. 12 Vertebra. It passes downwards on the bodies of the lumbar vertebrae, inclining slightly to the left, and on the body of L_4 it bifurcates into the two common iliac arteries; on the surface the point of bifurcation is 2 cm below and to the left of the umbilicus. From its posterior surface, at the bifurcation, the small median sacral artery runs, in the midline, over the promontory down into the hollow of the sacrum. This is morphologically the direct continuation of the aorta.

Branches of abdominal aorta fall into three main groups :

First, the single ventral midline branches to the gut and its embryological derivatives, these are :

(1) **the coeliac artery :** this is the artery of the foregut, and its three branches supply the alimentary canal down to the opening of the bile duct, and the derivatives, liver, spleen and pancreas. It arises from the front of the aorta, between the crura of the diaphragm, opposite the body of the twelfth thoracic vertebra. it is a short wide trunk, flanked by the coeliac group of the preaortic lymph nodes. The coeliac ganglia of the sympathetic system lie

one on each side and they send nerves to the artery which are carried along all its branches. The artery appears at the upper border of the pancreas and divides immediately into its three branches, the gastric artery , splenic artery, and hepatic artery.

(2) The superior mesenteric artery: it arises from the aorta ½ inch below the coeliac axis, at the level of the first lumbar vertebra; it is the artery of the midgut.

(3) Inferior mesentric artery : arises from the front of the aorta at the inferior border of the third part of the duodenum, opposite the third lumbar vertebra, at the level of the umbilicus, it is the artery of the hindgut.

Second , the paired lateral branches to the parieties; these are:

(1) The phrenic artery : which leaves the aorta in the aortic orifice and slopes upwards across the crus of the diphragm, which it supplies.

(2) Lumbar arteries: four in number, leave the abdominal aorta opposite the bodies of the upper four vertebrae. On the right side the inferior vena cava overlies the lumbar arteries.

Lastly , the paired visceral branches to the paired viscera; these are:

(1) **The suprarenal artery :** arise from the aorta between its phrenic and renal branches.

(2) **The renal artery :** a large vessel, arises at right angles from the aorta opposite the body of L_2. The Lt. artery is a little shorter than the right.

(3) **The gonadal arteries** : These have a similar origin and course in both sexes. Both testicular and ovarian arteries arise from near the front of the aorta, below the renal arteries but well above the origin of the inferior mesentric artery.

- Between the coeliac and the superior mesentric arteries, the aorta is overlaid by the splenic vein and the pancreas.

- Between the superior and inferior mesentric arteries lies the left renal vein and the third part of the duodenum, while below the inferior mesentric artery the aorta is covered by the parietal peritoneum on the floor of the left infra colic compartment [Last, 1984].

Collateral circulation after aortic occlusion :-

It depends on the level of the occlusion :

(1) Occlusion above the origin of inferior mesentric artery blood will pass through superior mesentric artery through its colic branches to colic branches of inferior mesentric artery.

(2) Occlusion below origin of inferior mesentric artery blood will pass through the superior rectal artery to the middle and inferior rectal arteries then to the branches of internal iliac artery. Blood also passes through lst and 2nd lumbar arteries to ilio-lumbar artery and superior gluteal artery [branches of internal iliac artery].

(3) Occlusion at the bifurcation :

Blood will pass through the lumbar arteries to deep circumflex iliac artery to external iliac artery to femoral artery. Blood also, can pass through lumar arteries to iliolumbar and lateral sacral arteries to internal iliac artery. [Hagerstown, 1973].

AETIOLOGY OF ABDOMINAL AORTIC ANEURYSM

INCIDENCE OF ABDOMINAL AORTIC ANEURYSM (AAA).

Abdominal aortic aneurysms, if not the most common of aneurysms , are certainly the most common type presenting clinically, being encountered several times as often as the next most common, popliteal aneurysms. The incidence of AAA in the adult population is 2-4% [Pasch., 1984].

Aneurysms of abdominal aorta have been encountered with greater frequency in the past 3 decades. Two factors seem to account for this fact :

(1) increase in life span, with parallel increase in arteriosclerosis, and (2) greater awarness of the diagnosis of abdominal aortic aneurysms [Haimovici, 1976].

Abdominal aortic aneurysms are more common in males than females with a raito of five to one [Kerstein, 1981].

Associated Pathological Conditions :

- It has been reported that more than 60% of people with AAA have hypertension [Kerstein, 1981].
- It has also been shown that the incidence of AAA is eight times higher in smokers than in nonsmokers [Cooley, 1984].