EVALUATION OF THE ROLE OF ULTRA-SONOGRAPHY OF THE ABDOMINAL AORTA

Thesis

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By

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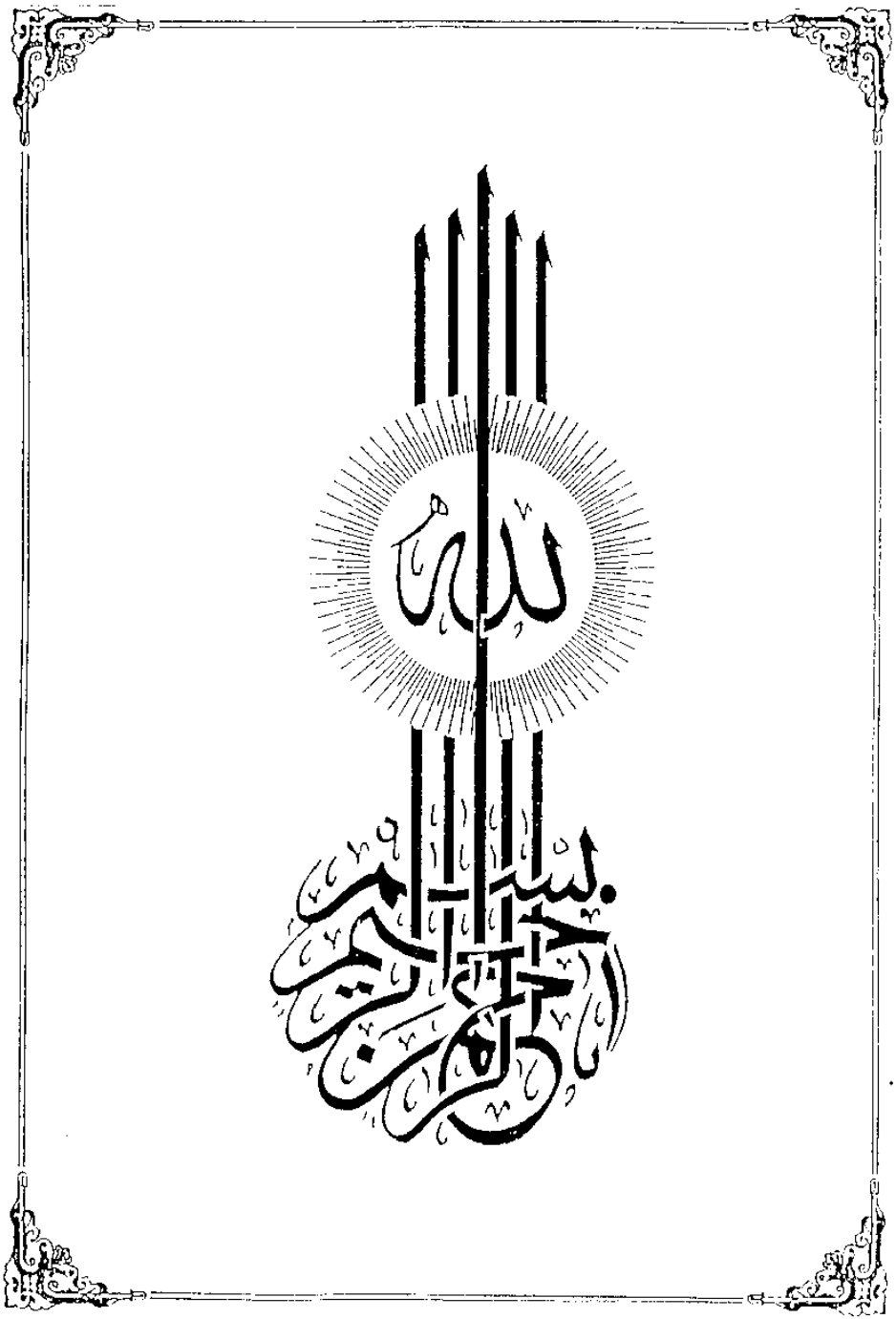

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Introduction :

The aorta is the largest, most important vessel in the body , the systemic circulation leaves the left ventricle of the heart by the aorta.

Importance of the abdominal aorta (which is the largest part of aorta) comes from that the abdominal aorta supplies all the abdominal organs either by single or double branches, direct or indirect and also the complication of its pathology is very dangerous and catastrophic to the human being either occlusion of any branched artery which is very important especially mesenteric vessels which may lead to mesenteric vascular occlusion or stenosis of any branch such as renal artery stenosis which lead to many complications to the kidney as shrinkage or hydronephrosis and finally the most disastrous complication which is rupture of abdominal aorta.

All of these make the sonographic examinations of the abdominal aorta is very important to detect any early pathology, and follow up any abnormality to prevent any complications.

Aim of the work

The importance of ultrasound and how is the best technique for examination of the abdominal aorta, the anatomy and pathology of the abdominal aorta, U.S anatomy of the abdominal aorta, ultrasonographic examination of the aorta, all of these will be discussed and evaluated in these study.

ANATOMY OF THE AORTA

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It is formed of 4 parts :

1. Ascending part: in the middle mediastinum.
2. Arch (and its 3 branches) in superior mediastinum.
3. Descending (thoracic) in post mediastinum.
4. Abdominal part of the aorta.

1. Ascending Aorta

(In the middle mediastinum)

A rise from the left ventricle behind left margin of the sternum opposite L. 3rd sternocostal space and runs upward, forward and to the right (behind the first piece of the body of the sternum) and ends by becoming the arch of the aorta behind the right margin of the sternum opposite the 2nd sterno costal junction.

2. The Arch of the Aorta

(In the superior mediastinum opposite the lower part of the manubrium)

It is directed from before backward and begins behind the right margin of the sternum opposite the second sternocostal junction and ends at the left side of the lower border of T_4 by becoming descending thoracic aorta.

3. The Descending thoracic Aorta

(In the posterior Mediastinum)

Beings (as a continuation of the arch) at the lower border of the left side of T_4 and ends at the aortic opening of the diaphragm (apposite T_{12}) where it becomes the abdominal aorta. It is related to 8 vertebrae and is about 8 inches (or 20 cm) in length.

4. Abdominal Aorta

Beginning :

It begins as a continuation of the thoracic aorta at the lower border of T_{12} in the median plane at the aortic opening of the diaphragm.

Counse :

- It descends in the whole course infront of the vertebral column with slight inclination to the left 70%, or in the middle line 7%, exceptional cases 5% the vessel runs right to the vertebral column.
- Sometimes it describes a mild curve and is in such cases mostly on the left side.
- The arched course bears an influence also upon the height of division.

Termination :

- Ends at the lower border of the fourth lumber vertebrae L_4 by dividing into two common iliac arteries.
- Division at the height of the 2nd lumber vertebra is exceptional.
- The division is deeper in advanced age, the angle of division is 65° to 75°.
- The length of the abdominal aorta is (20 to 23 cm), the diameter (2.3 cm) may be (1.5 to 3 cm).

The median sacral artery, the rudimentary continuation of the abdominal aorta, begins at the division in the midline. It may arise from either the two common iliac arteries, from this small artery passing infront of the sacrum, originates at the level of the 5th lumber vertebra the fifth lumber artery and the sacral branches.

Relations of the abdominal aorta :

* Anterior relation from above downward:

1) Coeliac and aortic plexuses.
2) Body of the pancreas and splenic veins.
3) Left renal vein.
4) 3rd part of the duodenum.
5) Root of mesentery, superior mesenteric artery.

6) Peritoneum of posterior abdominal wall separating it from the coils of small intestine.

N.B.:- Two veins cross infront of the aorta from left to right.

1) The splenic vein : between the origins of coeliac and superior mesenteric arteries.

2) The left renal vein : between the superior and inferior mesenteric arteries.

* Posterior relations :

1) Bodies of the upper lumber vertebrae and inter vertebral discs.

2) Anterior longitudinal ligament.

3) Third and forth lumber veins which cross behind the aorta to end in the inferior vena cava.

* On each side :

1) Crus of the diaphragm (upper part).

2) Sympathetic chain (lower part) along the whole course.

* On the right side: Inferior vena cava (I.V.C)

- The 2 vessels are in contact in the lower half of the abdomen-while

- in the upper half it deviates to the right from the aorta.

* On the left side :

1) Fourth part of the duodenum.

2) Coils of small intestine.

Branches of the abdominal aorta :

(A) **Single branches :** 4 arteries, 3 for the gut and one median sacral artery.

1) Coeliac artery: at the upper border of the 1st lumber vertebra.

2) Superior mesenteric artery : at the lower border of the 1st lumber vertebra.

3) Inferior mesenteric artery : at the 3th lumber vertebra.

4) Median sacral artery : arises from the back of the lower end at the level of the 4th lumber vertebra.

(B) **Paired branches :** from above downwards:

- Phrenic arteries.
- Middle supra renal arteries.
- Renal arteries.
- Testicular or ovarian arteries.
- Lumber arteries.
- Common iliac arteries.

I) Single branches :

(1 Coeliac trunk:

Which is the most superior abdominal visceral branch of the aorta, it arises from the anterior aortic surface, between the diaphragmatic crura. Just below the liver (within the 1st 2 cm of the abd. aorta). The projection of its origin is usually seen at the level of the vertebral space between the 12th thoracic and the 1st lumber vertebrae, the vessel may originate deeper if it arises together with the superior mesenteric artery. With reference to the anterior wall of the aorta, the vessel commences to the left of the midline in 25% and in the midline in 75%. Its origin on the right side is exceptional. The coeliac trunk measures (2-4.8 cm) (1.1 to 3.5 cm) in length and 1.01 cm (0.6 to 1.3 cm) in width.

Related to the renal artery, the distance of the origin is 1 to 4 cm and to the superior mesenteric artery, it originates at a distance of 0.92 cm (0.2 cm to 3.0 cm).

The coeliac trunk usually follow a downward course to the right, although it may exceptionally run upward to the right. The upper part of the pancreas crosses the abdominal aorta immediately below the origin of coeliac trunk. It bifurcate 1 to 3 cm from its origin forming the common