ROLE OF RADIOLOGY AND IMAGING IN DIAGNOSIS OF RENAL MASSES

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NAGWA AHMED AWAD
(M.B., B.Ch)

SUPERVISORS

PROFESSOR DR. ABD EL-MONEIM ABOU SINNA
Professor of Radiology,
Faculty of Medicine
Ain Shams University

DR. AHMED ABD-AL-TAWAB MOHAMED
Assist. Professor of Radiology,
Faculty of Medicine
Ain Shams University

FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY

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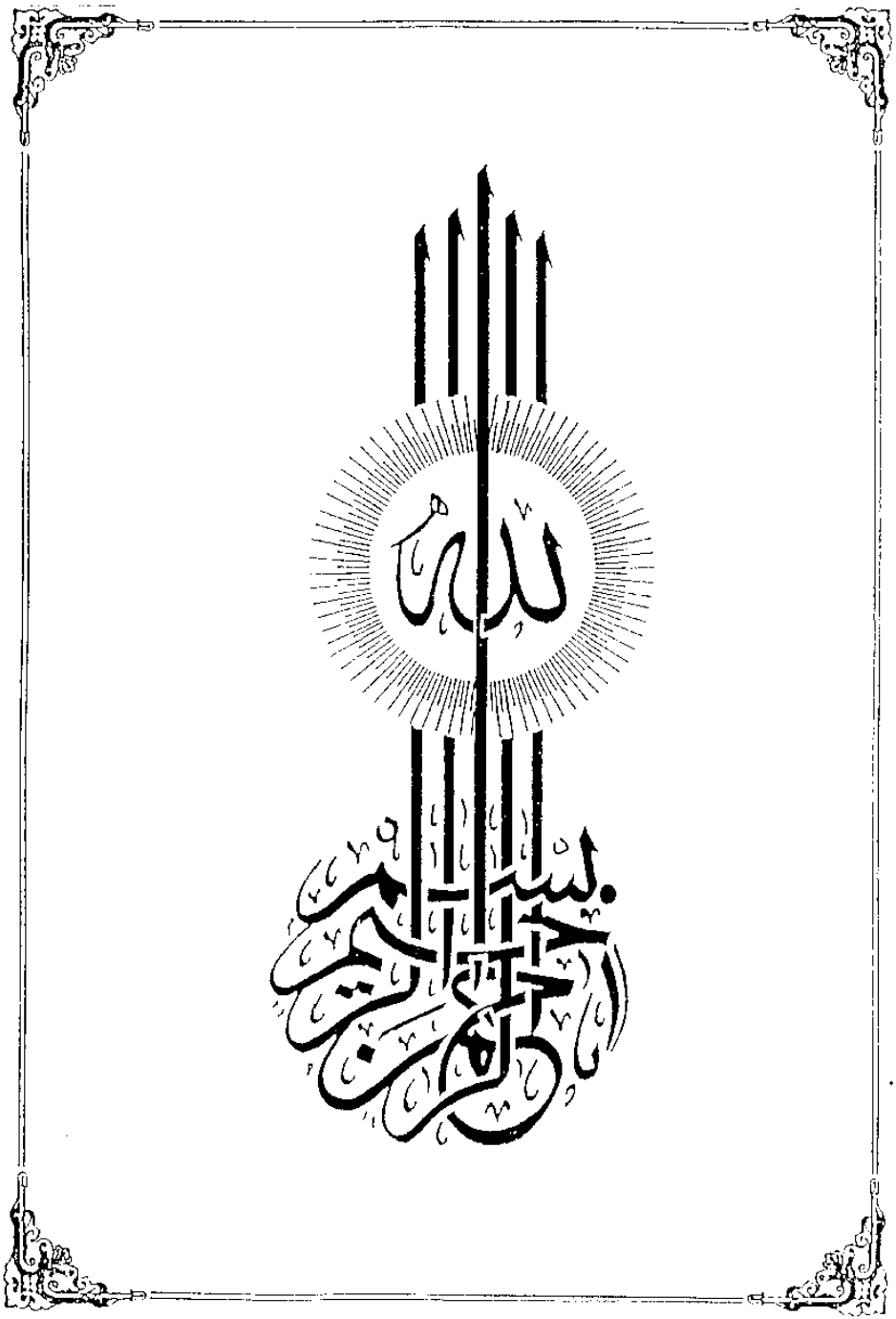

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Although excretory urography remains the basic method for detection of any renal pathology, yet, cross section techniques(U.S and C.T) are used to differentiate cystic and solid masses. Also, angiography is a method to demonstrate changes in renal vessels in renal masses. So, the aim of this work is to emphasize the role of all these methods in diagnosis of renal masses.

ANATOMY OF KIDNEY

ANATOMY OF THE KIDNEY

The kidneys are paired, retro peritoneal, bean-shaped organs, lying on each side of the vertebral column. Usually, the right kidney is slightly lower than the left due to the presence of the liver(Davies, 1967).

The upper pole is approximately 4 Cm closer to the midline than the lower pole. Each kidney is about 12 Cm in length, 6 Cm in breadth and 3 Cm in thickness. Their upper poles are the level of the twelfth thoracic vertebra and their lower poles at the level of third lumbar vertebra. As regards the shape, the kidneys are normally bean-shaped (Meschan, 1975).

Foetal lobulation, however is frequently encountered in children. Additionally, lobulation may indicate partial or complete duplication of one kidney that may be without special pathological significance. The surface of the kidney is invested by a thin strong fibrous capsule. External to it is a considerable quantity of fatty tissue known as the adipose capsule or Gerato's capsule. This capsule, permits identification of the kidney on plain radiographs since it is more radio lucent than the surrounding muscular structures. Also,inflammation or neoplasms may invade this fatty envelope

and impair good detail.(Meschan, 1975).

The relationship of the kidney to other retroperitoneal structures:-

Posteriorly, the kidney lies on a muscle bed composed of the diaphragm, the psoas major, quadratus lumborum and transversus abdominis muscles. The diaphragm separates the upper part of the kidney from the pleura and the twelfth rib (Davies, 1967) (Diagram 1).

Anteriorly, the right kidney has the following relationships: the suprarenal gland overlaps its upper end, especially medially and the duodenum overlaps it along its hilus. The hepatic flexure of the colon covers the lower end of the kidney. A loop of jejunum lies between the colon and duodenum. The right lobe of the liver tends to overlie the right kidney (Davies, 1967) (Diagram 2).

The left kidney, anteriorly, has the following relationships; the suprarenal gland caps its upper medial portion, and the spleen borders upon its upper lateral aspect. The body of the pancrease with the splenic vessels lies across the kidney at its mid-section. (Last, 1973).

The left half of the transverse colon crosses the kidney below the pancrease, and the descending colon

overlaps its lower part laterally. The area above the pancreatic region is related to the stomach.(Cunningham, 1968).

The stomach, the transverse colon and the jejunum are all separated by the peritoneum, and although the spleen is also separated by peritoneum it is attached at one point by the lieno renal ligament(Davies,1967).

LONGITUDINAL SECTION OF THE KIDNEY : (Coronal section)

The substance of the kidney as revealed by this section has the following main parts : an external cortex, an internal medulla, renal tubules and renal pelvis. (Meschan, 1975).

The external cortex is 12 - 15 mm. thick and contains numerous renal corpuscles (also known as Malpigian corpuscles consisting of a vascular glomerulus invaginated in a Bowman's capsule), also the cortex contains the proximal parts of collecting tubules,the convoluted tubules and minute blood vessels.
The cortex is actually composed of two portions:-

1. A peripheral layer "the cortex proper" and
2. Processes called renal columns which dip inward between renal pyramids to reach the bottom of the sinus of the kidney. They contain interlobar arteries.

These arteries when they reach the base of the pyramids bend forming the arcuate arteries which enter the cortex. (Anson, 1966).

The internal medulla contains eight to eighteen pyramidal structures called renal pyramids. The base of it joins the renal cortex and the apex projects into the renal pelvis (Renal papillae) (Meschan , 1975).

There are many collecting tubules and ducts of Henel's

in each pyramid, finally the collecting tubules empty in the papilla in a small opening.(Anson, 1966).

The renal pelvis forms the collecting duct system leading to the ureter. Usually it is formed of two major calyces which divide into minor calyces each of which terminates in relation to one, two or sometimes three renal papillae. (Meschan, 1975) (Diagram 3).

BLOOD SUPPLY OF THE KIDNEY:

The kidneys are supplied by two renal arteries arising from the aorta immediately below the superior mesentric artery at the level of the disc between the first and second lumbar vertebrae. The arteries are directly at right angles at their point of origin. The left artery is shorter than the right and originates at a slightly higher level. Each artery divides into 4 to 5 branches before reaching the hilum, these branches are to be found between the renal vein anteriorly and ureter posteriorly (Meschan, 1975).

The apical segment is usually supplied largely by the posterior or dorsal branch of the renal artery,whereas the lower segment of the kidney is supplied by the anterior or ventral branch of the renal artery for the most part. (Boijsen, 1959) (Diagram 4).

The renal veins are parallel to the renal arteries upon emerging from the kidney, two main branches are formed which empty into the inferior vena cava. The left vein is longer and at a slightly higher level. Anastomosis between renal and systemic vessels occur in the fat around the kidney. (Davies, 1967).

* LYMPHATIC DRAINAGE:

Two separate systems are demonstrable: One begins in cortex and accompanies the interlobular vessels towards the cortico-medullary junction. The other starts at the papilla and ascends to join the cortical system at the cortico-medullary junction. From there large trunks follow the arcuate and interlobar vessels to leave the kidney at the hilus terminating at lymph nodes on either side of the aorta.(Meschan, 1975).

* NERVE SUPPLY :

The kidneys are supplied by a rich plexus,formed of filaments from coeliac ganglion, coeliac plexus,aortico-renal ganglion, lowest thoracic splanchnic nerve, 1st lumbar splanchnic nerve and aortic plexus. (Last, 1973).

The plexus is continued into the kidney around branches of the renal artery, mainly it is vaso motor in function (Meschan, 1975).