RENAL TRANSPLANTATION

An essay submitted for partial fulfillment of the degree of M.S. general surgery.

Submitted by

MAGDY WAHBA ABDALLA

Supervised by

PROFESSOR Dr. NABEIL AHMAD ALLUBA

Professor of General surgery

Ain Shams University

and

Dr. RAFI[illegible]

Lecuture of General surgery.

Ain Shams University

Faculty of medicine

Ain Shams University

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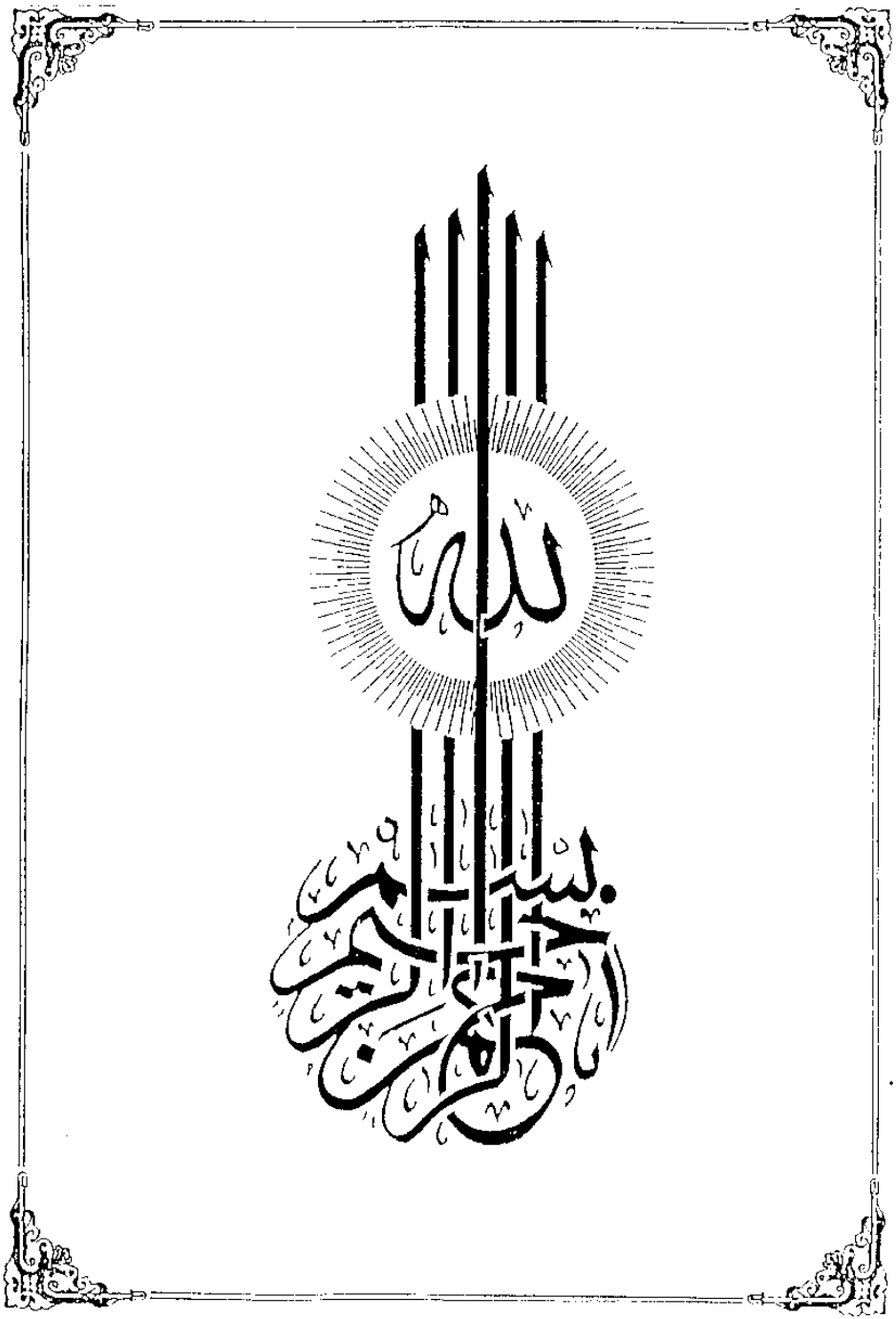
Sayings of the great

From treating patients as cases, and
From putting knowledge before wisdom
Science befor art, cleverness before
commen sense, Good lord deliver us.

Hutchison R.

1871-1960



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Anatomy of the ureter.

Emberyology of the kidney:

Three different ,slightly overlaping kidneys are formed during the successive development. They develop from the nephrogenic cord which arises from the intermediate mesoderm.

A) Pronephros: It is the earliest and the simplest kidney. It develops in the cervical region consisting of 7-10 rudementary tubules with a collecting longitudinal pronephric duct. The tubules disappear completely by the end of the 4^{th} week together with the cranial part of the pronephric duct. The pronephros acts as an inducer for the development of the mesonephros.

B) Mesonephros: It is the second kidney system to appear. It is found in the thoracic and lumber region. It consists of " S " shaped tubules which have renal corpuscles at their medial ends. Their latral ends open in the mesonephric duct (Wolfian duct) previously named pronephric duct. It is thought that the mesonephros in man is physiologically active (croisille-1979). By the end of the second month most of the tubules and their corpuscles disappear. The fate of the rest of the tubules and of the wolfian duct is sex dependent. In the female embryo, they disappear almost completely except for some nonfunctioning remnants.

In the male embryo, the persisting secretory tubules become the vasa efferentia of the epidydimis and the wolffian duct gives rise to the vas deferens, the ejaculatory and the duct of the epidydmis.

C. Metanephros.

It is the functioning kidney of mammals
It develops from two sources: - 1. The excretory units develop from the intermediate mesoderm in the form of a solid mass named the metahephric cap. 2. The collecting ducts are formed by an outbudding of the ureteric bud from the lower end of the mesonephric duct. The upper end of the ureteric bud enlarges forming the future pelvis of the ureter. From the pelvis, the major calyces the minor calyces and the collecting tubules are formed by continuous branching (Potter-1972).

Change of the kidney's position, blood supply and hape:

In the early stages the metanephros is found in the lower lumber and sacral region (it is a pelvic organ).Then it moves upward till it finally lies infront of the upper part of the posterior abdominal wall. This ascent occurs between the end of fifth and the begining of the eighth week. This ascent seems to be more apparent than real being essentially due to rapid growth of the posterior part of the body (Hamburger et al 1979).

During the ascent the kidney changes its blood supply from the median sacral to the commen iliac to the lower part of the abdominal aorta.

During the early stages the kidney is lobulated, its convex border looks posteriorly while its hilum looks anteriorly but later the kidney loses its lobulation. its surface becomes smooth and it rotates by 90^{o} thus its hilum is directed medially

(Croisille-1979).

Gross anatomy.

Position

It lies behind the peritoneum of the posterior abdominal wall, largly under cover of the costal margin, extending from the level of the last thoracic vertebra to that of the third lumber. The right kidney is slightly lower due to its relation to the liver Its hilum is just below the transpyloric plane while that of the left kidney lies above that plane. The long axis of the kidney is directed upward and medially parallel to the medial border of psoas major muscle while the transverse axis is directed backward and latrally

Measurments.

length 4 inches		breadth	2inches
thickness linch		weight	130 grams

The hilum

The hilum gives passage to the renal vessels and nerves together with the pelvis of the ureter in the following way:- the renal veim anteriorly the pelvis posteriorly and the renal artery is in between them.

Relations of the kidney

Posterior relations

The posterior surface has no peritoneal coverings and is related to the following structures.

A) The diaphragm:

The diaphragm and the medial and latral arcuate ligaments are related to the upper part of the posterior surface. The diaphragm separates the kidney from the posterior recess of the pleura. The diaphragm separates the right kidney from the last rib while separating the left kidney from the last rib, last intercostal space and the lower border of the 11^{th} rib . The upper part of the posterior surface may be also related to the vertebrocostal triangle which is the gap between the costal and vertebral origin of the diaphragm, here the kidney is separated from the diaphragmatic pleura only by a bed of fat.

B) Psoas major muscle

It is related to the posterior surface close to the medial border of the kidney and below the diaphragmatic area.

C) Quadratus lumborum muscle.

It is related to the posterior surface latral to the area related to psoas major muscle and below the diaphragm The kidney is separated from the quadratus lumborum by the

subcostal vessels subcostal nerve. iliohypogastric and ilioinguinal nerve arranged successively from above downwards.

d) Transversus abdominus.

This muscle is related by its origin from the lumber fascia to the posterior surface close to the latral border of the kidney below the diaphragm.

Anterior relations

Rt.kidney.

The anterior surface of the right kidney has a partial covering of peritoneum and is related to the following viscera.

1. Suprarenal gland. at the upper end and upper part of the medial border.
2. Second part of the duodenum: close to the medial border and hilum of the right kidney.
3. Right lobe of the liver is related to a large area of the anterior surface latral to the second part of the duodenum.
4. Right colic flexure is related to the lower and latral part of the anterior surface.
5. Coils of small intestine are related to the lower and medial part of the anterior surface, this part is also related to the ascending branch of the right colic artery.

The suprarenal gland, duodenum and right colic flexure lie directly in front of the right kidney but the areas related to the liver and small intestine are covered with peritoneum.

Left kidney (anterior relations)

The anterior surface of the left kidney has a partial covering of peritoneum and is related to the following viscera:

1. Suprarenal gland: It is related to the upper part of the medial border.

2. Spleen: It is related to the part of the anterior surface close to the upper part of the latral border.

3. Body of pancrease and splenic vessels are related to the middle part of the anterior surface.

4. Stomach is related to the triangular area between the suprarenal gland area, splenic and pancreatic areas. and the size of the gastric area of contact is very variable.

5. Descending colon is reltade to the lower and medial part of the anterior surface. This part is also related to the ascending branch of the superior left colic artery.

The suprarenal gland, body of pancrease and descending colon lie directly infront of the kidney. The spleen and the small intestine are separated from the kidney by the peritoneum of the greater sac. The stomach is separated from the kidney by the peritoneum of the lesser sac.

Renal fascia. Perirenal fat-Pararenal fat.

The kidney with the suprarenal gland lie within the so called perirenal space which is enclosed by the perirenal fascia Gerota's fascia It consists of anterior and posterior layers formed by the splitting of the retro-peritoneal fattytissue and extends over the anterior and posterior surfaces of the Kidney. The anterior layer is the peritoneum with the connective tissue behind the colon,= duodenum and pancreas.

Latrally the two layers unite firmly and are conte-nious with retroperitoneal tissue. Superiorly the anterior and the posterior layer fuse at the upper pole of the kidney and extend upward to form special compartment for the suprarenal gland. Medially they fuse extending for a small area in vicinty of the ureter. The layers merge medially into the mass of connective tissue surrounding the inferior vena cava aorta as well as the renal vessels There is no connection between the perirenal spaces of the right and left sides (Grossman 1954). Inferiorly the two layers are separate.

The perinephric fat is contained within the renal fascia while the layer of fat lying outside the fascia is called the pararenal fat.

Pelvis of the ureter.

This is a dilated sac which occupies the renal sinus. It extends out side the hilum to become continuous with the ureter. Inside the kidney the pelvis divides into two branches (sometimes three) which are known as the major calyces. Each major calyx divides into several smaller branches known as the minor calyces. The minor calyces are 10-12 in number Each ends by surrounding one or more of the renal papillae.

Blood supply

Renal arteries.

They are branches arising from the sides of abdominal aorta at the level of second lumber vertebra

The right artery passes behind the inferior vena cava head of pancreas, descending part of duodenum and the right renal vien The left artery passes behind the body of pancreas and the left renal vein.

Each divides usually into three branches which enter the hilum of the kidney two in front and one behind the renal pelvis. The posterior branch passes to the upper pole but another posterior branch passing to the lower pole may be present and may be associated with ureteric obstruction.

The kidney is divided into 5 vascular segments each is supplied by a branch of the renal artery. These segments are:-

1. Apical including the medial side and anterior part of upper pole.