# DIAGNOSTIC ASPECTS OF ULTRASONOGRAPHY IN INTRENSIC RENAL DISEASES

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BY

MOHAMED MOHAMED AMIN

M. B, BCH

SUPERVISED BY

PROF. DR.

ABD EL MONAM ABOU SINNA

PROFESSOR OF RADIODIAGNOSIS

AIN SHAMS UNIVERSITY



DR. OMAR H. OMAR

LECTURER OF RADIODIAGNOSIS

AIN SHAMS UNIVERSITY

FACULTY OF MEDICINE

AIN SHAMS UNIVERSITY

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# ACKNOLEDGMENT

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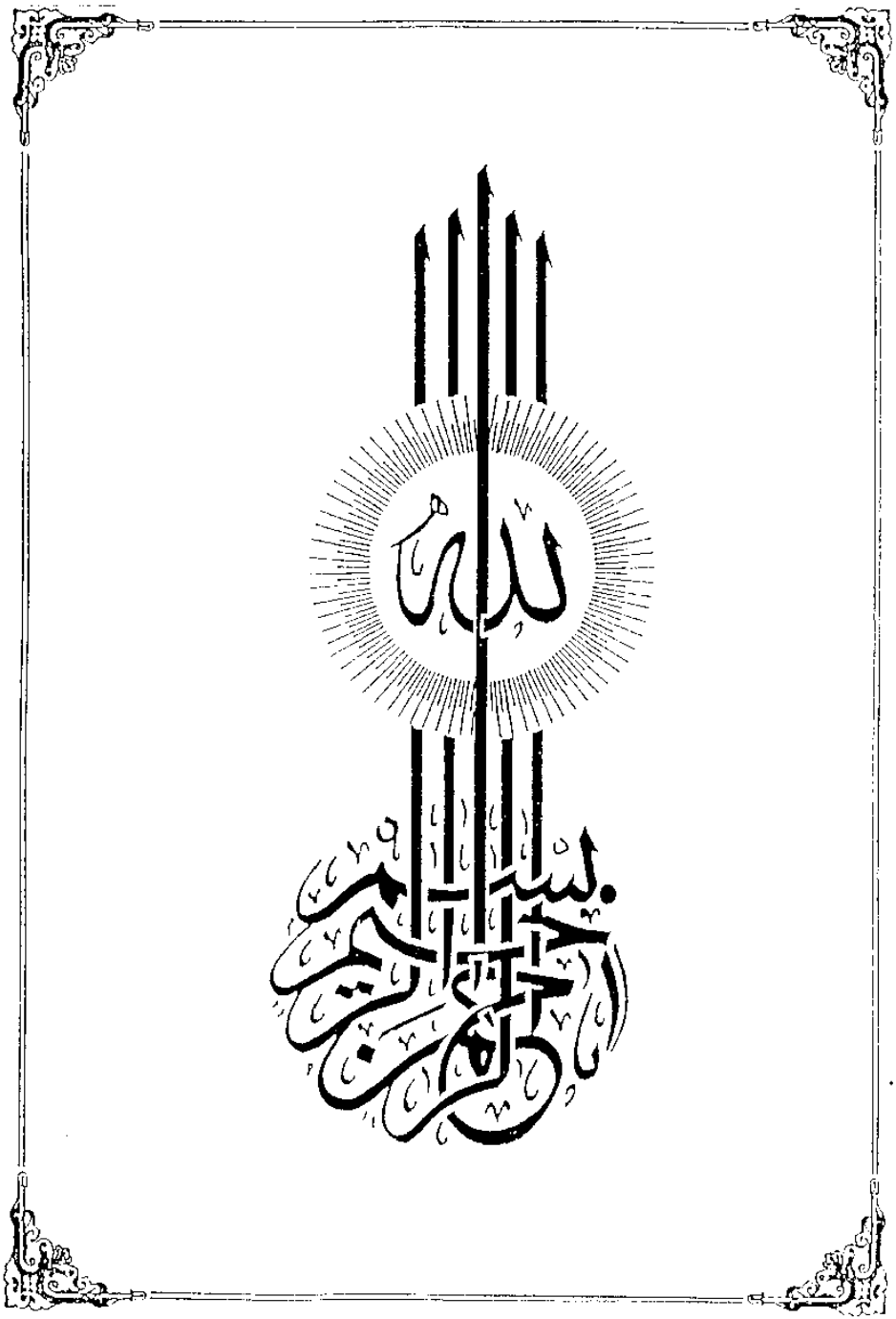

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Ultrasound was not produced in laboratary till handered years ago, when the Curie brothers first demonestreted the piezzo-electric effect [1880] . The first practical use of this principal was in detection of enemy submarines in world war I .

***Dussik, in Austria, in 1942*** made the first attempt to use ultrasound in medical diagnosis. With the time passing, the principle and techniques of ultrasound scanning have been continuosely altered as technolgic advances have taken place.

Ultrasound scanning has obvious advantages such as lack of radiation hazards, simplicity, easiness, cheapness, needless previous preparation of the patient, etc...

The aim of this study is to describe the different ultrasonic manifestations of intrensic renal diseases and to emphasize it's value in the diagnosis of such conditions.

# ANATOMY OF THE KIDNEY

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## Anatomical Considerationas

The kidneys are paired structures which lie in the para vertebral gutters of the posterior abdominal wall opposite the bodies of the last thoracic and upper three lumber vertebrae.

They lie in the retroperitoneal space under cover of the costal margin. The right kidney is slightly lower than the left due to the right lobe of the liver.

The longitudinal axis of the kidneys is obliquely oriented, with the lower pole located more laterlly than the upper pole *[Wicks & Howe, 1983]*.

The medial border of each kidney faces slightly anteriorly and the lateral border slightly posteriorly *[Kaye & Goldberg, 1982]*.

As a result of this slight rotation of the kidney an anteroposterior radiograph gives a somewhat foreshortened picture of the width of the kidney *[Last, 1984]*.

There is variation in position and shape according to the body built. In a slender person with a long narrow abdominal cavity the kidneys tend to be lower than in a stocky person with a broad abdominal cavity.

Movement from the supine to the erect position & breathing may downward shift the normal kidney as much as 2.5 cm *[Kaye & Goldberg, 1982]*.

The adult kidney weights 135 - 150gms and measures approximately 11 cms from anterior to posterior surface. Frequently, the left kidney is little longer and more slender than the right *[Gosling et al., 1983]*.

Generally both kidneys will attain appproximately the same dimensions. A difference of more than 1.5 to 2 cms is significant *[Hagen - Ansert, 1983]*.

The kidneys are bean shaped bodies, the lateral border of each organ being convex and the medial border bing concave, and they have slightly convex anterior and posterior surfaces.

The anterior and posterior surfaces are usually smoothly convex, although marked lobulation is a normal feature before birth and during the first post - natal year,

and may occasionally persist into adult life *[Gosling et al., 1983]*.

The posterior renal surface is flatter than the rounded convx anterior surface . In approximately 10% of left kidneys there is a bulge of renal parenchyma on the lateral aspect, this is the splenic or dromedary *[Kaye & Goldberg, 1982]* which is thought to result from compression by the spleen during development *[Frimann, 1961]*.

In the middle of the concave medial border of each kidney lies the hilum, a slit approximately 3 cms long through which pass the renal pelvis, nerves, blood vessels and lymphatics *[Kaye & Goldberg, 1982]*.

The hilus expand into the body of the organ to from a central cavity called the renal sinus. Although the relations of the structures that pass through the hilum may vary, the usual pattern is that the renal vein is anterior, the pelvis is posterior, and the renal artery lies between the vein and the pelvis. The hilum of the right kidney is below the transpyloric plane, and in the left kidney the hilus is above it *[Walter & Kruger, 1984]*.

***Relations of the kidney :***

The posterior surface of each kidney is directed postero medially, and they have almost similar relations *[Walter & Krueger, 1984]*. it can usually be considered as four areas, each of which is related to one particulalr muscle. The upper most area, superolateral to the twelfth rib, is in contact with the diaphragm. The regions inferomedial to the rib can be subdivided into three areas which from medial to lateral sides relate to the Psoas major, the guadratus lumborum and the transversus abdominus muscles *[Gosling et al., 1983]*.

Passing inferior and laterally between the quadratus lumborum and the kidney are the subcostal vessels and the subcostal, ilio hypogastric, and ilio inquinal nerves *[Kaye & Goldberge, 1982]*. Fig. (1).

The left kidney, in addition, is related to the 11$^{th}$ rib. fig. (2.

The anterior surface of each kidney faces anterior - laterally and their relationship differ on the two sides of the body *[Walter & Krueger, 1984]*.

Anteriorly the right kidney is related to the right suprarental gland which overlap the upper end especially

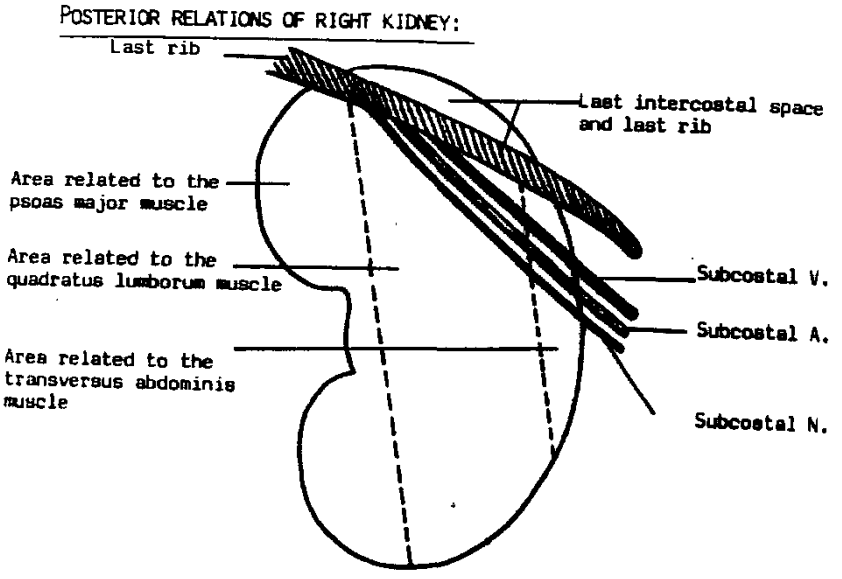


***Fig., [1]:***

**Posterior relation of right kidney [Coated from Nor El-Din., 1983 : P. 90].**

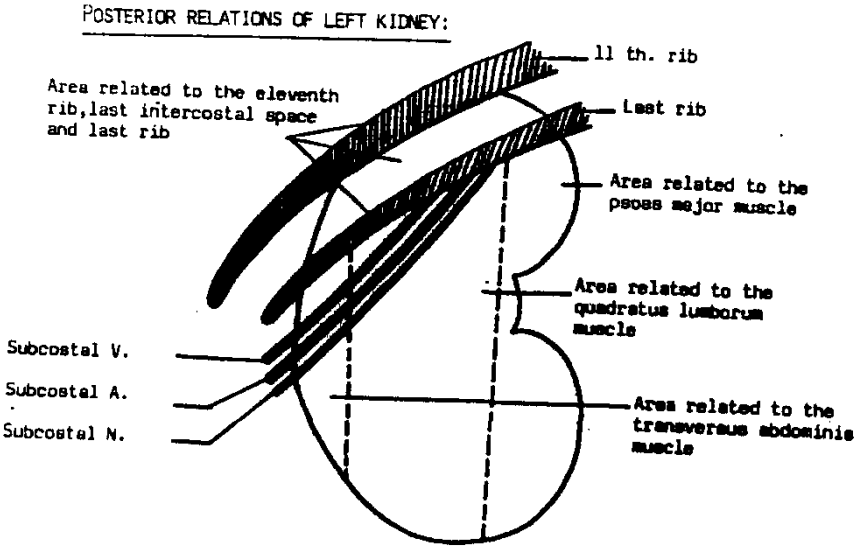


***Fig. [2]:***

**Posterior relation of left kidney [ Coated from Noor El-Din., 1983 : P. 90].**

toward the medial side. A large area just below this and involving about three - fourths of the anterior surface, lies in the renal impression on the right lobe of the liver. A narrow area near the medial border, including the hilum, is in contact with the descending part of the duodenum. the lower part of the anterior surface is in contact laterally with the right colic flexure, and medially with a part of small intestine *[Davies, 1967]*.

The left kidney is related anteriorly to a large number of structures; the left suprarenal gland overlaps the superior pole and medial border of the kidney as far as the renal hilus. The spleen is related to the superolateral aspect of the left kidney's anterior surface. The tail of the pancreas, accompanied by the splenic vessels, lies horizontally across the hilus of the kidney.

Above the superior border of the pancreas, the kidney presents an area between the suprarenal gland and the spleen which forms part of the stomach bed. Inferior to the pancreas the anterior surfance of the left kidney is covered medialy by coils of jejununum and more laterally by transverse mesocolon, the splenic flexure and the commencemtent of the descending colon *[Gosling et al., 1983]*. Fig. (3).

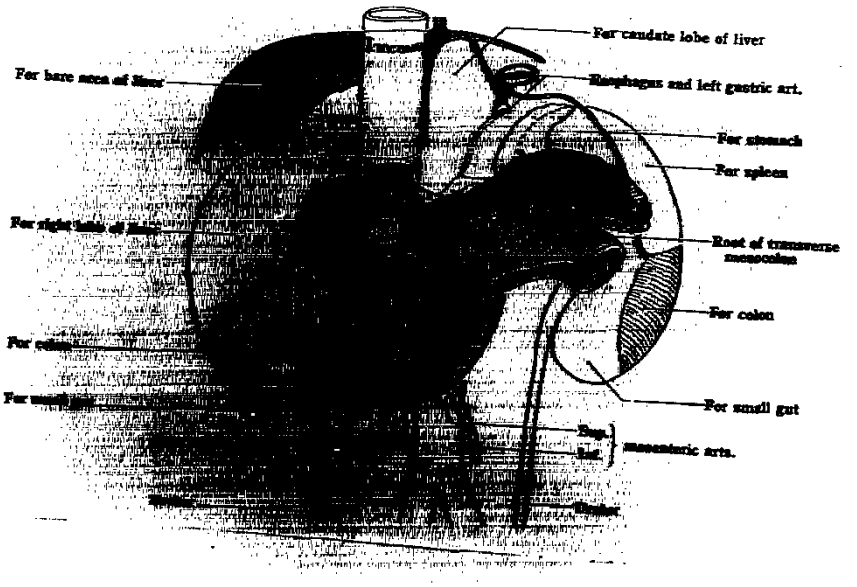


*Fig., [3]:*

**Anterior relation of the kidneys [ Coated from Anderson J.E., 1976 : 11th edition 2 - 73.**

Although the kidneys are retroperitoneal there are certain areas that are not covered with the peritoneum. On the left side, the areas related to the suprarenal gland, pancreas, and descending colon are devoid of peritoneum, and for the right kidney, the areas related to the surparenal gland, duodenm and colon are also devoid of paritoneum *[Walter and Krueger, 1984]*.

The kidney has four coverings: the true capsule, the perirenal space and fat, Gerota's fascia and the pararenal fat. The true capsule is a tough, fibrous membrane that is colosely aplied to the underlying parenchyma. Capillaries and lymphatics extend from the capsule into the renal substance *[Kaye, & Goldberg, 1982]*.

Surrounding the renal capsule is the perirenal fat, varying in thickness and traversed with multiple strands of connective tissue. Immediately adjacent to this fatty capsule is the renal fascia. This fascial plane separates the perirenal fatty capsule from the pararenal fat in the retroperitoneal space, the renal fascia is a collagenous, elastic connective tissue sheath of medium or dense consistency arising rom the retroperitoneal tissue, cranialy extending to surround the adrenal gland from the kidney *[Marx & Patel, 1979]*. The sheath of fascia is attached to the diaphragm, the lumber vertebrae, the peritoneum, and other adjacent structures. So the kidneys are supported in a