DIAGNOSTIC ASPECTS OF COMPUTERIZED TOMOGRAFY IN RETROPERITONEAL MASSES

THESIS

SUBMITTED FOR PARTIAL FULFILMENT OF MASTER DEGREE

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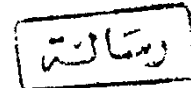### RADIODIAGNOSIS

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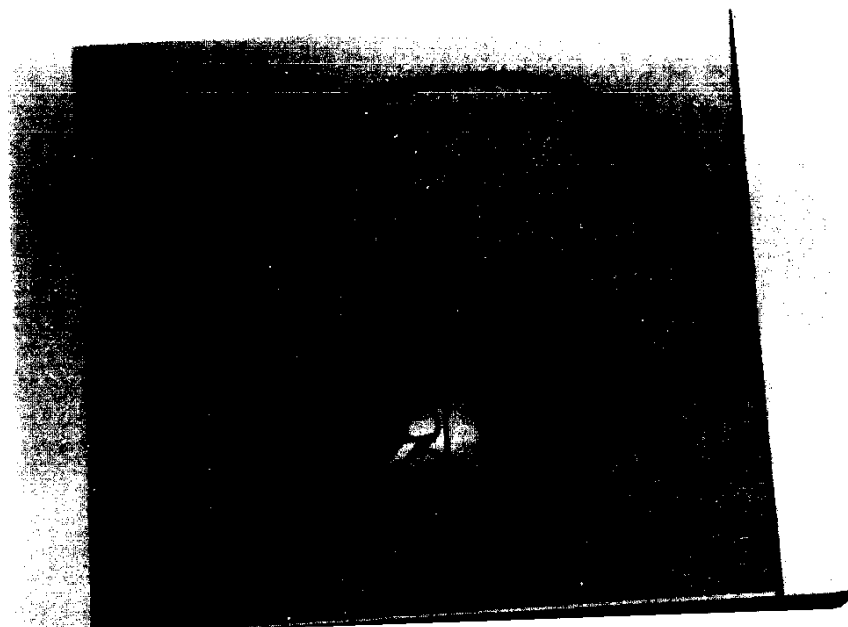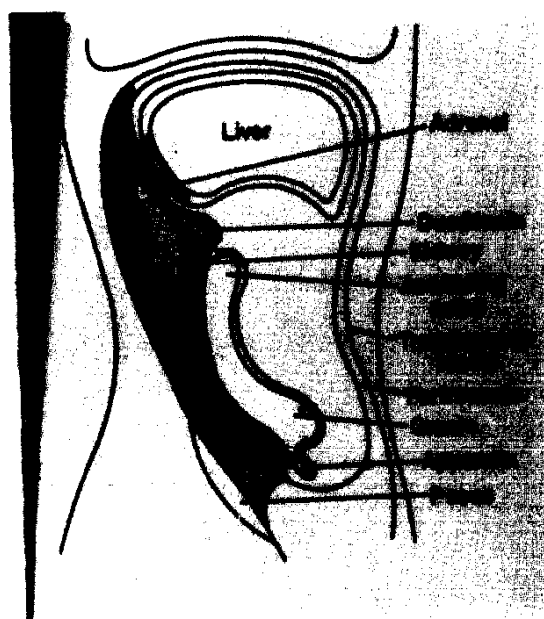
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(Quoted from Love et al., 1981)

INTRODUCTION AND AIM OF WORK

Retroperitoneum is that portion of abdomen located posterior to the peritoneal cavity. The multiplicity of structures together with variability of lesions affecting them has made its radiological diagnosis very important.

In the past, plain abdominal radiography, conventional radiography, and excretary urography were the main methods resorted to for evaluation of the retroperitoneal organs. They proved to be less accurate in this respect. They are usually confined with the indirect effects of the lesions until a significant abnormality has been shown. Besides, the nature and extent of the lesion could not be anticipated.

Ultrasound has a great role in evaluation of retroperitoneal organs, however it needs experience and has its own limitations.

Since the advent of CT, direct non invasiue demonstration of normal and pathologic retroperitoneal anatomy has been possible with a level of clarity unsurpassed by any other available imaging method. Furthermore, a CT examination is accomplished rapidly and with little compromise to the patient's safety, comfort, and convenience.

The aim of this study is to emphasize the role of CT in the diagnosis of retroperitoneal masses.

I

CT ANATOMY OF RETROPERITONEUM

The retroperitoneum is that portion of the abdomen located posterior to the peritoneal cavity. It extends from the diaphragm superiorly to the level of the pelvic viscera inferiorly.

Two types of viscera exist in the retroperitoneal space:
The true embryonic retroperitoneal organs (i.e, the adrenal glands, kidneys, urters, and gonads), and those structures closely attached to the posterior abdominal wall and only partly covered by the peritoneum (i.e, aorta, inferior vena cava, pancreas, portions of duodenum, colon, lynph nodes, and nerves) *(Diagram 1 & 2)*. *(Lee et al., 1986)*.

The ventral (anterior) surface of the retroperitoneum consists of the posterior parietal peritoneum, and its dorsal (posterior) boundary is the fascia overlying the quadratus lumborum muscle and psoas muscle (transversalis fascia).

CT Anatomy of retroeritoneal spaces:

AT the level of the kidneys, the retroperitoneum is commonly divided into three well-defined spaces by the anterior and posterior renal fascia (Gerota's renal fasia) *(Diagram 3)* and *(Fig. 1)*, they are:-

I.   Anterior pararenal space.

II.   Perirenal space.
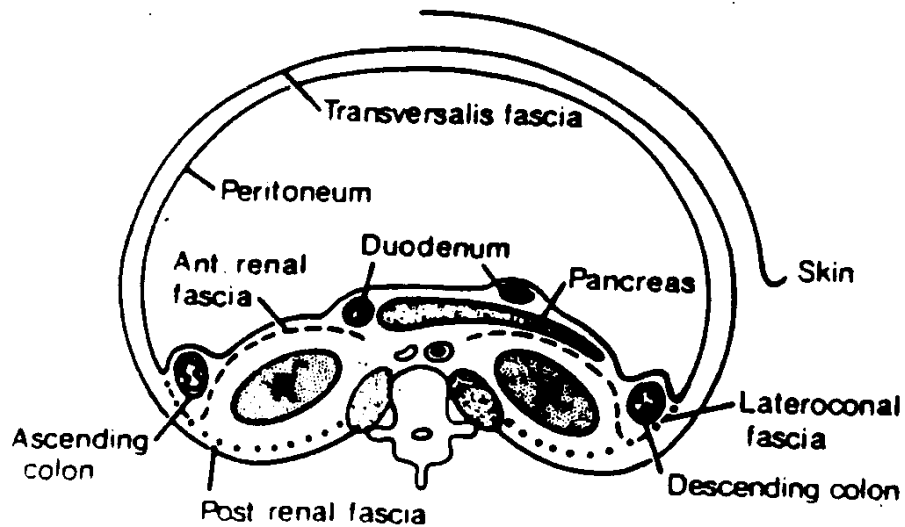
III.   Posterior pararenal space

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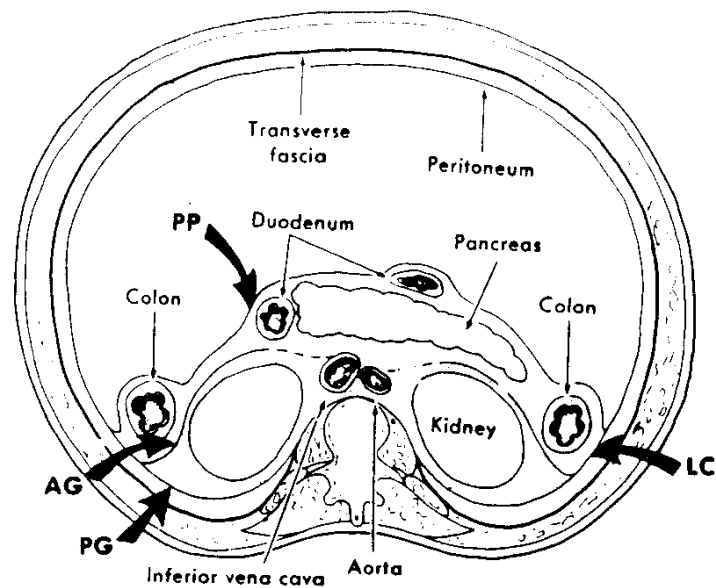
Diagram (3): *The fascial planes of the retroperitoneum showing the anterior renal fascia (AG), posterior renal fascia (PG), lateroconal fascia (LC), posterior parietal peritoneum (PP), transverse fascia, and peritoneum.*
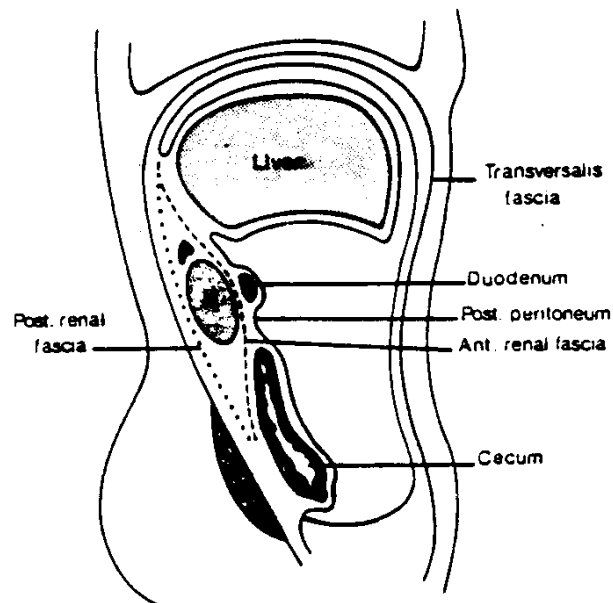
(Quoted from Haaga, J.R., et al., 1979)

Fig. (1): *CT of the fascial planes of the retroperitoneum (arrow heads).*

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Diagram (4): Retroperitoneal spaces. K = kidney, Axial section of the pancreas. Anterior pararenal space.

(Quoted from Sutton, 1987)

Diagram (5): Right parasagittal section through the right kidney shows: The anterior pararenal space is in direct continuity with the bare area of the liver.

(Quoted from Dodds et al., 1986)

I.   Anterior Pararenal space:

The anterior pararenal space is bounded anteriorly by the posterior parietal peritoneum, posteriorly by the anterior renal fascia, and posterolaterally by the lateral continuation of the renal fascia and lateroconal fascia. It contains little fat. Therefore, the posterior parietal peritoneum and the anterior renal fascia are close to one another centrally but assume a triangular configuration as they approache the ascending and descending colon. *(Parient et al., 1981).*

The anterior pararenal space contains the pancreas, retroperitoneal portions of the duodenum, ascending and descending colon. The posterior parietal peritoneum normally surrounds both the ascending and descending colon anteriorly and on either sides. This results in the peritoneal cavity extending both laterally and slightly medial to the ascending and descending colon *(Diagram 4).* Sometimes, in about 26% of people, the ascending colon has a mesentry (i.e completely invested by the posterior parietal peritoneum). The fat filled space between the posterior parietal peritoneum and the ascending and descending colon is frequently narrow. So that pathological processes which involve only the peritoneal cavity may silhouette out the anterior, lateral, and much of the medial margin of the ascending or descending colon, yet not involve the retroperitoneum. The bare area of the liver is in direct continuity with the anterior pararenal space *(Diagram 5).*

The anterior pararenal space is continuous across the midline, although collections of fliud or gas tend to localize frequently on either side of this compartment below the region of pancreas.

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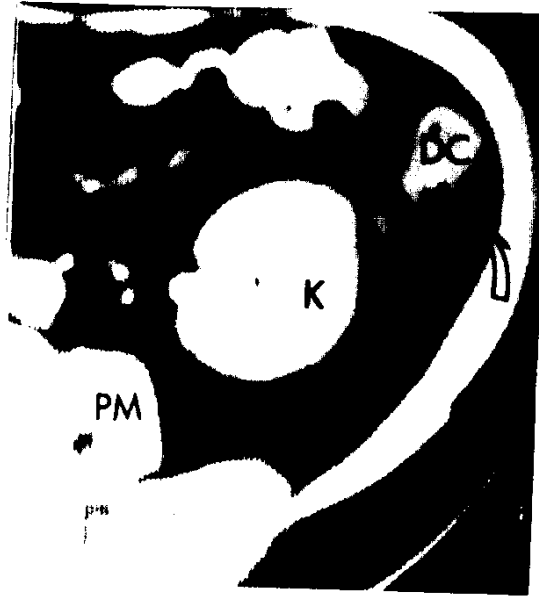
Fig. (2): Anterior renal fascia (arrow), posterior renal fascia (open arrow), and lateroconal fascia (curved open arrow). k = kidney, DC = descending colon, PM = psoas muscle.

(Quoted from Love et al., 1981)

II. The perirenal space:

The perirenal space is cone-shaped vertically, with the apex of the cone pointing inferiorly. It lies within the anterior and posterior renal fascia and contains the kidneys, adrenals, proximal renal collecting systems and renal hilar vessels. The posterior boundary of the perirenal space is composed of the posterior renal fascia which extends medially behind the kidneys and merges with the fascia covering the quadratus lumborum and psoas muscle. Lateral to the kidneys the anterior and posterior renal fascia fuse to form a single fascia (the lateroconal fascia). *(Warwick et al., 1973)*. The lateroconal fascia then continues ventral and lateral to the ascending or descending colon and fuses to the parietal peritoneum. *(Fig. 2)*. The fused fascia then continues laterally to join the fascia covering the transversalis muscle of the anterior abdominal wall. The right anterior and posterior renal fascial layers fuse lateral to the kidney and join with the parietal peritoneum at the inferior surface of the liver (Diagram 5). The right perirenal space is open towards the bare area of the liver and fluid collection within one space may communicate with the other space across the coronary ligament *(Lim et al., 1990)*.

The perirenal spaces communicate across the midline, at least in some individuals. The communicating channel at the third to fifth lumbar levels is thin in anteroposterior dimention and may be overlooked on conventional radiographs or CT scans. The anterior walls of the aorta and vena cava are in contact with this midline channel making it relatively easy for aortic aneurysms to rupture into the perirenal spaces *(Kneeland et al., 1987)*.
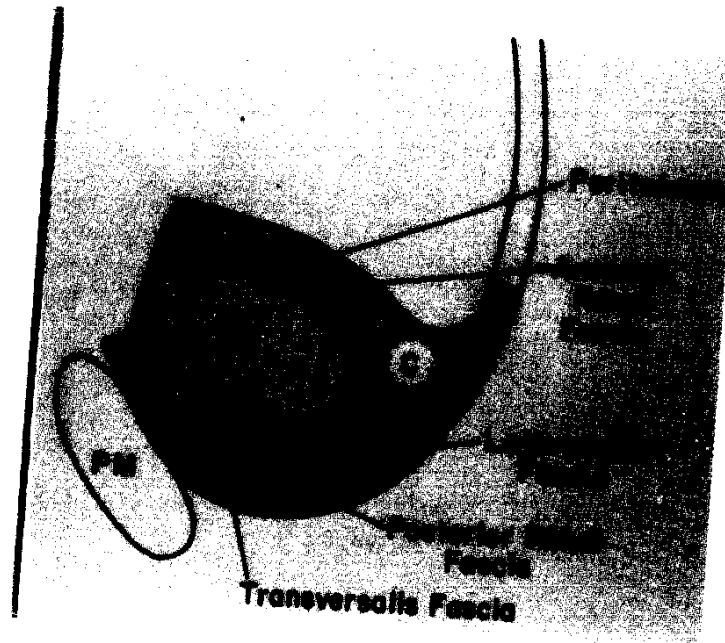
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Diagram (6): Various fascias which compartementalize retroperitoneum. k = kidney, c = descending colon, PM := psoas moucle. Posterior pararenal space (red), perirenal space (yellow), anterior pararenal space (blue).
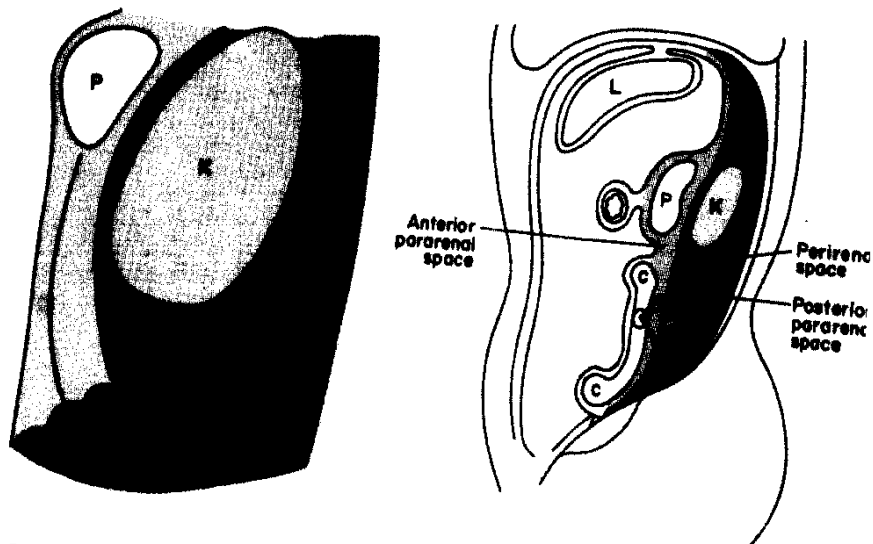

Diagram (7): Pathway of fluid extending from the anterior pararenal space (blue) around the inferior border of perirenal space (yellow) into the posterior pararenal space (red).

(Quoted from Love et al., 1981)

The perirenal space contains an abundant amount of fat which is subdivided by bridging septec. These perirenal septae appear thus to prevent fluid collections from spreading, while they seem to be the preferential pathways for the diffusion of malignant lesions. The perirenal fascia fuse mesdially and blends with the retroperitoneal fat surrounding the great vessels and adjacent lymph nodes. Inferiorly, the perirenal fascia fuses, terminating the perirenal space above the pelvis. Thus the anterior and posterior pararenal spaces communicate below the perirenal space. *(Camerini et al., 1988).*

III. The posterior pararenal space:

The posterior pararenal space is situated between the posterior renal fascia and the transversalis fascia of the posterolateral abdominal wall *(Diagram 6)*. Medially, it is bordered by the quadratus lumborum muscle and laterally continuous as the pro-peritoneal compartment. This space is opened laterally and recognized on a conventional abdominal radiograph as the "Flank stadow". At the level of the iliac fossa, below the caudal extent of the perirenal space, the posterior pararenal space fuses with the anterior pararenal space to provide a potential route for spread of fluid or infiltrate from one pararenal compartment to the other *(Diagram 7). (Stephens et al., 1983).*

This space contains only fat and no organs. The psoas and other back muscles are the most dorsally located retroperitoneal structures and are located behind the posterior pararenal space.

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