THE DIAGNOSIS OF INTRA-ABDOMINAL ABSCESS BY ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY

THESIS

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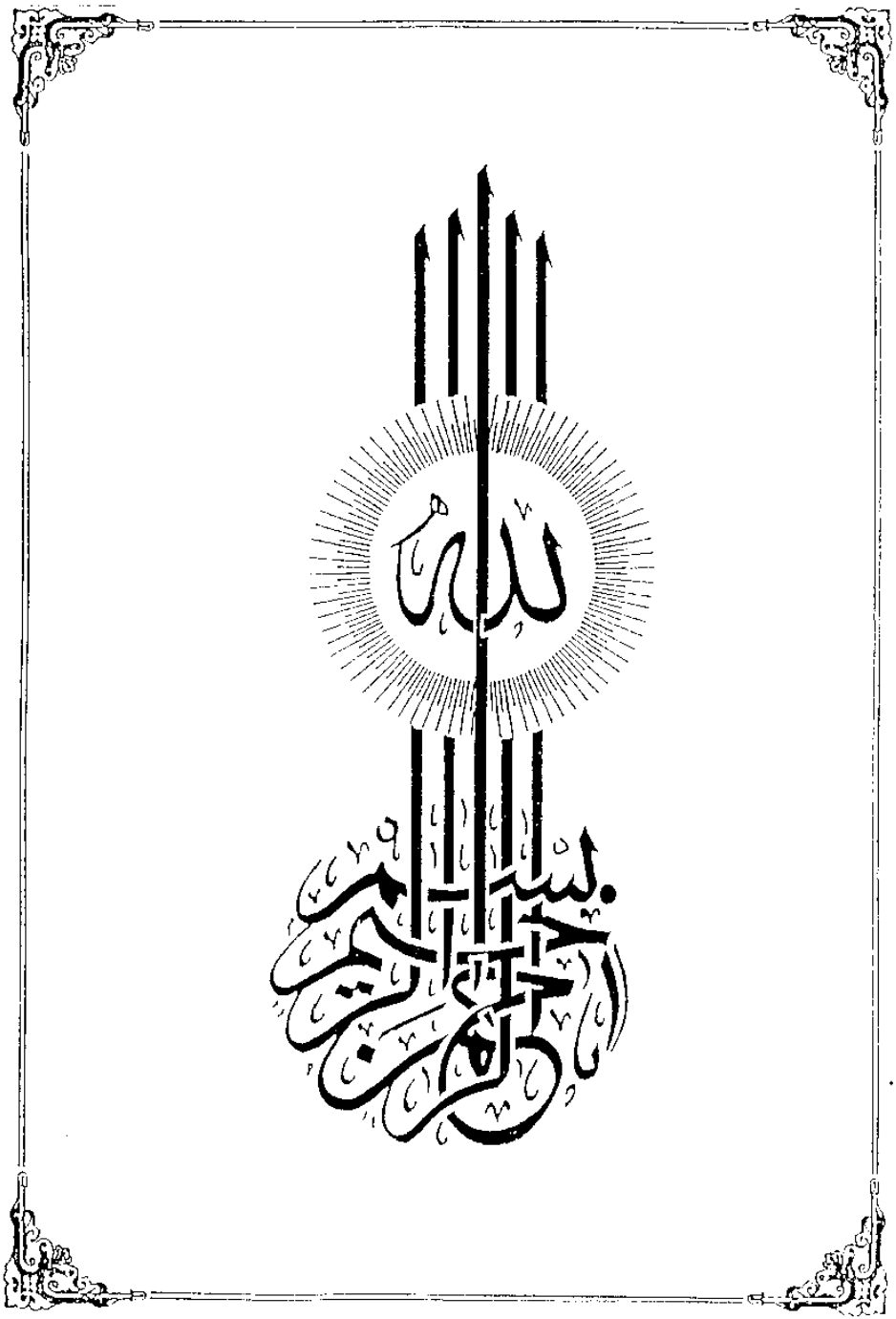

INTRODUCTION AND AIM OF THE WORK

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In the past, the clinical course of an intraabdominal abscess was often complicated and was rapidly fatal. Now, intra-abdominal abscesses are most often present insidiously with non specific symptoms- such as: fever, malaise and abdominal discomfort, most likely due to the partially mitigating effects of the concurrently administered antibiotics.

Nevertheless, abdominal and pelvic abscesses continue to cause high morbidity and mortality rates. Thus, early diagnosis and prompt drainage of abscesses remain essential.

In the past, the radiologist has been constrained by the limitations imposed by conventional radiography and radionuclide agents. Recent advances in cross-sectional imaging as Ultrasound and Computed Tomography have significantly changed the investigative approach and have enabled the radiologist to diagnose intraabdominal abscesses and fluid collections effectively and expeditiously. This in turn has led to a rapid increase in the use of Ultrasonography (US) and Computed Tomography (CT) for guided needle aspiration of the collections for specific diagnosis and drainage.

The aim of this study is to describe the role of Ultrasonography and Computed Tomography in evaluating intra-abdominal abscesses.

ANATOMY

Anatomy of the Intra-peritoneal Cavity

The abdominal cavity is defined by the transversalis fascia; therefore all structures lying within the transversalis fascia are within the abdominal cavity. The abdominal cavity is further divided by the peritoneum into the peritoneal cavity and the retroperitoneum. Finally, the peritoneal cavity is divided into the greater and lesser peritoneal cavities, (Filly, 1984).

Within the peritoneal cavity, there are numerous recesses in which abscesses tend to loculate. The transverse mesocolon divides the peritoneal cavity transversely into the supra- and inframesocolic spaces. The supra- and inframesocolic spaces are divided right from left by the falciform ligament (superior to the transverse colon) and the root of the small bowel mesentery (inferior to the transverse colon). This results in the five general areas that must be mastered, (Fig.1) and (Table 1): The right and left supramesocolic spaces (SMCS), the right and left inframesocolic spaces (IMCS) and the true pelvis, (Meyers, 1976).

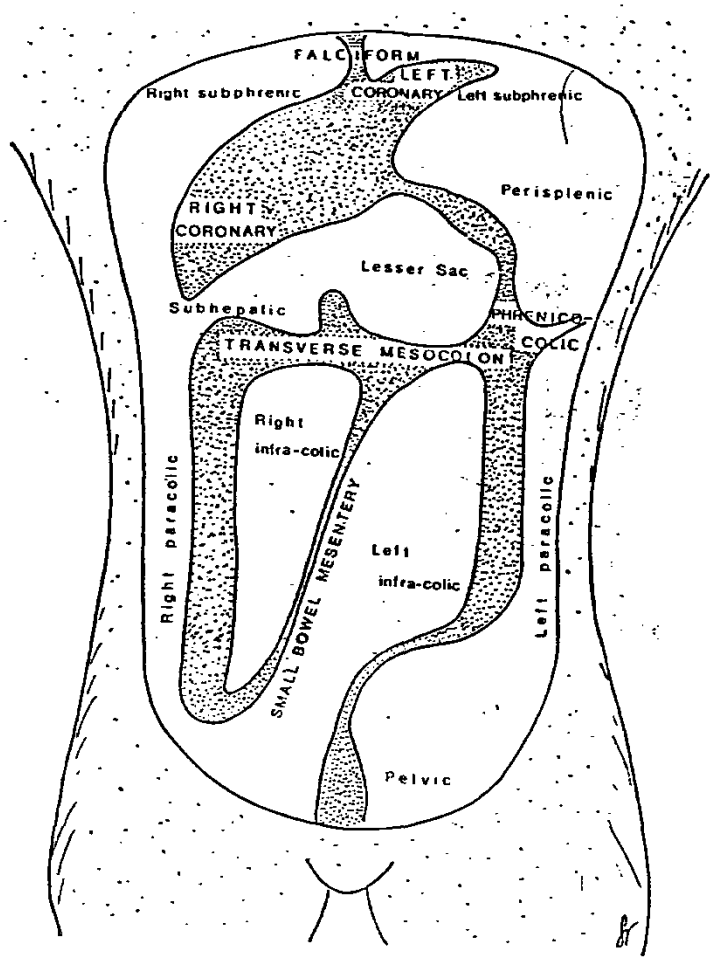

Fig 1: Peritoneal reflections and peritoneal spaces.

(Quoted from Sutton, 1987).

TABLE (1)

Peritoneal Spaces :

Supramesocolic

Right upper quadrant
- Subphrenic
- Anterior subhepatic
- Posterior subhepatic (Morison)

Left upper quadrant
- Subphrenic (Gastrohepatic recess)
- Subhepatic
- Lesser sac

Inframesocolic

Right side
- Paracolic gutter
- Right infracolic space

Left side
- Paracolic gutter
- Left infracolic space

Pelvis
- Supravesical
- Paravesical
- Rectovesical (Pouch of Douglas)

(Quoted from Filly, 1984)

There are three recesses each in the right and left SMCS. The right SMCS is divided into the subphrenic space and the anterior and posterior subhepatic spaces. The posterior subhepatic space is more commonly known as the Morison's pouch. The left SMCS is divided into a subphrenic space, a subhepatic space and the lesser sac. The left subhepatic space is more commonly known as the gastrohepatic recess,(Filly, 1984).

There are two recesses in each right inframesocolic and left inframesocolic spaces. The right inframesocolic is divided into the paracolic gutter (PCG) and the right infracolic space; similarly, the left inframesocolic is divided into the paracolic gutter (PCG) and the left infracolic space. The right PCG is larger than the left and communicates freely both cephalically into the right SMCS and caudally into the pelvis. The left PCG also communicates freely with the pelvis, but cephalic movement of any inflammatory fluid is limited by the phrenico-colic ligament, (Filly, 1984).

The pelvis is basically a continuous space, but it is further divided into the supravesical space (superior to the dome of the bladder), the right paravesical space, the left paravesical space, and the rectovesical

space or cul-de-sac (Douglas Pouch), depending on whether one is examining a male or female respectively, where abscesses tend to localize in one or more of these specific locations, (Filly, 1984).

Anatomy of Retroperitoneum

The retroperitoneal space, (Fig.2), is bounded anteriorly by the posterior parietal peritoneum and posteriorly by the transversalis fascia overlying the lumbar quadrate and psoas muscle. It extends from the diaphragm superiorly to the level of the pelvic viscera inferiorly. The retroperitoneal space contains the pancreas, kidneys, ureters, adrenal glands, portions of the duodenum, the ascending and descending colon, aorta, inferior vena cava, lymph nodes and nerves, (Lee, 1983).

At the level of the kidneys, the retroperitoneal space is anatomically divided into three extraperitoneal components by well defined fascial planes. These are :

(1) Anterior pararenal space

(2) Perirenal space

(3) Posterior pararenal space, (Harell, 1985).

The Anterior pararenal space :

The anterior pararenal space extends from the posterior parietal peritoneum (anteriorly) to the

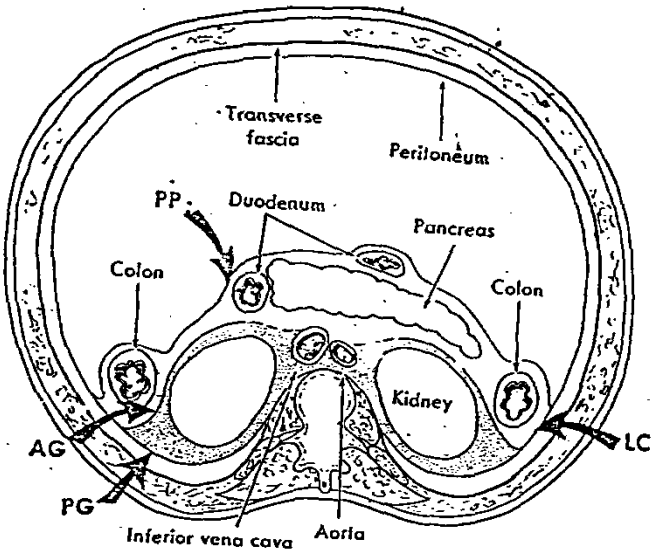

Fig 2: The fascial planes of the retroperitoneum.
(AG): Anterior renal fascia
(PG): Posterior renal fascia
(LC): Lateroconal fascia
(PP): Posterior parietal peritoneum

(Quoted from Haaga and Alfidi, 1985).

anterior renal fascia (posteriorly). This space contains the pancreas, the descending, transverse and ascending duodenum, and the ascending and descending colon which lie more laterally within this space, (Harell, 1985).

At levels below, the anterior and posterior pararenal spaces are contiguous and are in part bounded posteriorly by the fascia, the lumbar quadrate, iliacus and psoas muscles, (Harell, 1985).

The anterior pararenal spaces are continuous across the midline although collections of fluid or gas are reported to frequently localize in the anterior pararenal space on the side of origin. Collections of fluid arising in the pancreas, however, may involve both sides of the anterior pararenal space because the pancreas extends to both sides of this compartments, (Harell, 1985).

Below the region of the pancreas, the anterior pararenal space becomes narrow centrally but assumes a triangular configuration as it approaches the ascending and descending colon, (Harell, 1985).

Perirenal Space :

The perirenal space encloses the kidney. Its anterior margin comprises the anterior renal fascia, and

the posterior margin is composed of the posterior renal fascia. The inferior boundary of the perirenal space is in the approximate region of the iliac crest. Superiorly, it continues around the kidneys and adrenals where the anterior and posterior renal fasciae fuse. The fused fascia is continuous with the diaphragmatic fascia. The medial boundary of the perirenal space is not well defined. Meyers in 1976 reported that there is no direct communication existing between the perirenal spaces on either side. However, Gerota in 1895 demonstrated bilateral continuity deep to the anterior renal fascia, (Harell, 1985).

The anterior renal fascia is made up of dense connective tissue that runs anterior to the kidneys and blends into the connective tissues investing the aorta, vena cava, and the root of superior mesenteric vessels. The posterior renal fascia extends medially behind the kidneys and merges with the fascia covering the lumbar quadrate and the psoas muscles. Renal infections usually remain confined to the perirenal space and do not penetrate the anterior and posterior renal fasciae. Infrequently, however, they may traverse the fascial planes and involve the anterior or posterior pararenal space, (Harell, 1985).