

THE ROLE OF ULTRASOUND
IN DIAGNOSIS
OF CASES OF ACUTE ABDOMEN

THESIS

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By

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INTRODUCTION AND AIM OF WORK

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The acute abdomen denotes any sudden disorder whose chief manifestation is in the abdominal area and for which urgent operation may be necessary.

The approach to a patient with acute abdomen must be orderly and thorough. The history and physical examination should suggest the choice of diagnostic study and the probable causes.

Ultrasonography, as a multi-organ scanning capability, is helpful in evaluating and diagnosing acute abdominal pain. Particularly in pregnant and Pediatric patients, it may explain atypical symptoms without imposing any radiation hazards.

Aim of our study is to discuss the role of ultrasonography in diagnosing, reaching an etiological diagnosis and follow-up of the different cases of acute abdomen. Also, to present some illustrative cases for demonstrating the value and accuracy of ultrasonography in these conditions.

ANATOMICAL CONSIDERATION

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The ability of the sonographer to understand anatomy as it relates to the cross sectional, coronal, oblique, and sagittal projections is critical in performing a quality sonogram.

Normal anatomy has many variations in size and position, and it is the responsibility of the sonographer to be able to demonstrate these findings on the sonogram. To complete this task the sonographer must have a thorough understanding of anatomy as it relates to the anterior-posterior relationships, as well as the variations in sectional anatomy. (Sandra 1989).

THE ABDOMEN IN GENERAL:

The abdominal cavity, excluding the retroperitoneum and the pelvis, is bounded superiorly by the diaphragm, and anteriorly by the abdominal wall muscles, posteriorly by the vertebral column, ribs and iliac fossa, and inferiorly by the pelvis.

Regions of the abdomen: (Fig.: 1)

The abdomen is divided into nine different regions:

(1) left hypogastrium, (2) epigastrium, (3) right

hypogastrium, (4) left lumbar, (5) umbilical, (6) right lumbar, (7) left iliac, (8) hypogastric, and (9) right iliac.

- Horizontal planes of the abdomen:

In addition there are two horizontal planes in the abdomen. The transpyloric plane runs through the level of L_1 . The subcostal plane runs through L_3 and joins the lowest portion of the thoracic cage on the left to the lowest portion of the thoracic cage on the right.

- Vertical planes of the abdomen:

The two vertical planes are the midclavicular lines. Each of these joins the mid point of the clavicle with the midlingal point (i.e., the mid point of a line joining the anterior superior iliac spine and the symphysis pubic).

- Quadrants of the abdomen:

Another way of dividing the abdomen is with quadrants. Equal parts of the abdomen may be separated into the left upper quadrant, right upper quadrant, left lower quadrant, and right lower quadrant. (Sandra 1989).

THE ANTERIOR ABDOMINAL WALL

The anterior abdominal wall is composed of several layers of muscles: the rectus abdominis, the external oblique,

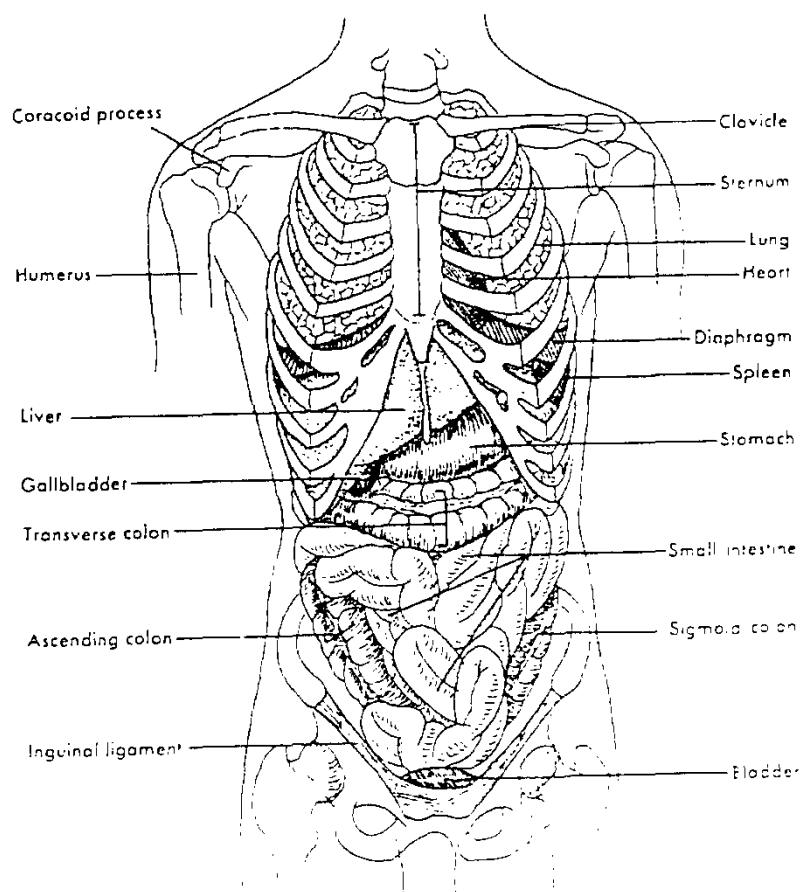
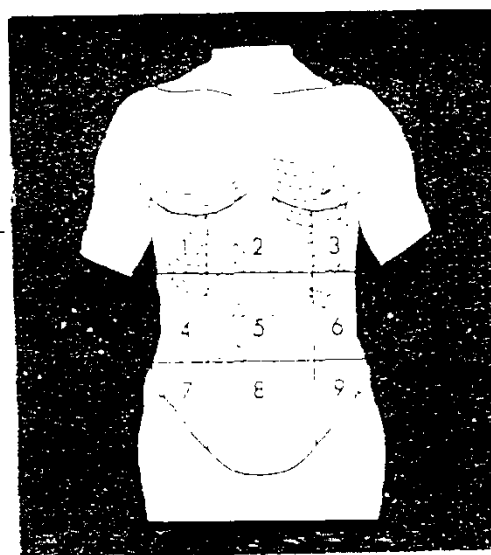


Fig. 1 : Upper horizontal line, transpyloric plane; lower horizontal line, trans-tubercular plane. Vertical lines left and right lateral planes. Regions 1 and 3, hypochondriac; 2, epigastric 4 and 6 lumbar; 5 umbilical 7 and 9, iliac or inguinal; 8 hypogastric.

"Quoted from Illustrative Anatomy
by El-Rakhawy, Egypt, 1983"



internal oblique and transversus abdominis. The linea alba is a fibrous band that stretches from the xiphoid to the symphysis pubis. It is wider at its superior end and forms a central anterior attachment for the muscle layers of the abdomen. It is formed by the interlacing of fibers of the aponeuroses of the right and left oblique and transversus abdominis muscles.

Fascia: The fascia of the abdominal wall is divided into superficial and deep fascia. The superficial may be further divided into two layers: the superficial layer contains fatty tissue (Camper's fascia) while the deep layer is mostly membranous with little fat (Scarpa's fascia).

PERITONEUM:

The peritoneum is formed by a single layer of cells called the mesothelium, resting on a thin layer of connective tissue.

The peritoneum is further divided into two layers; the parietal peritoneum is that portion of peritoneum which lines the abdominal wall but does not cover a viscus, the visceral peritoneum is that portion of peritoneum that covers an organ. The peritoneal cavity is the peritoneal space between the parietal and visceral peritoneum. The peritoneum lines

the wall of the abdominal cavity, forming a completely closed sac, with the exception of the mouths of the fallopian tubes in female which open into it.

Retroperitoneal organs remains posteriorly to the sac and are covered anteriorly by the peritoneum. This primarily applies to the urinary system. The other abdominal organs are located within the peritoneal cavity.

Mesentery:

Is a double fold of peritoneum connecting an organ to the abdominal wall.

Omentum:

Is a double layer of peritoneum running to the stomach. The lesser omentum attaches to the lesser curvature of the stomach and the greater omentum attaches to the greater curvature of stomach. The greater omentum runs inferiorly to attach to the transverse colon.

Lesser sac:

The posterior surface of the lesser omentum is continuous over the posterior surface of the stomach with the inner layer of the ligment of the stomach and kidneys with the upper layer of the transverse colon. These surfaces form the boundaries of the lesser sac.

Hepatorenal recess

Is the lowest point in the peritoneal cavity when the patient lying supine, just to the right of the epiploic foramen. The right kidney is the medial margin, while the liver forms the superior boundary. The right paracolic gutter drains fluid from this pouch.

Epiploic foramen:

Is bordered anteriorly by the hepatoduodenal ligament, posteriorly to the peritoneum. The inferior vena cava, superiorly and inferiorly the posterior parietal peritoneum is reflected on to the quadrate lobe of the liver and duodenum.

Peritoneal recesses:

The omental bursa normally has some empty places, these are clinically important because infections may collect in them. Two common sites, are where the duodenum becomes the jejunum and where the ileum joins the cecum.

Peritoneal gutteres:

The mesentery of small intestine, ascending colon and descending colon is attached to the posterior abdominal wall. As a result, four gutteres exist that can conduct fluid

materials (e.g. ascites, abscess, blood, bile) from one point of the peritoneal cavity to another. The right paracolic gutter is to the right of ascending colon, it may conduct fluid from the omental bursa via the hepatorenal pouch into the pelvis.

The left lateral paracolic gutter is to the left of the descending colon. There are two gutteres to the right and left of the mesentery that open into the pelvic cavity. (sandra 1989).

ANATOMY OF THE IMPORTANT ORGANS INSIDE THE ABDOMINAL ----- CAVITY: -----

(1) LIVER: -----

The liver occupies almost all of the right hypochondrium, the greater part of the epigastrium and usually the left hypochondrium as far as the mammillary line. The liver lies close to the diaphragm. The ribs cover the greater part of the right lobe. In the epigastric region the liver extends several centimeters below the xiphoid process. Most of the left lobe is covered by the rib cage.

Lobes:

Right Lobe. Is the largest of the four lobes of the liver. It occupies the right hypochondrium and is bordered on its upper border by the falciform ligment, on its posterior by the left sagittal fossa, and in front by the umbilical notch. Its inferior and posterior surfaces are marked by three fossae: the porta hepatis, the gall bladder, and the inferior vena cava fossa.

Left Lobe. Lies in the epigastric and left hypochondriac regions. Its undersurface includes the gastric impression and omental tuberosity.

Caudate Lobe. This small lobe is situated on the posterosuperior surface of the right lobe opposite the tenth and eleventh thoracic vertebrae. It is bounded below by the porta hepatis, on the right by the fossa for the inferior vena cava and on the left by the fossa for the venous duct.

Quadrate Lobe. It is oblong and situated on the posteroinferior surface of the right lobe. Infront, it is bounded by the anterior margin of the liver, behind by the porta hepatis, on the right by the fossa for the gall bladder and on the left by the fossa for umbilical vein