The Abdomen The Abdominal Wall

Xiphisternal junction

T11

T12

L2

L3

0

L4

Costal margin

Xiphoid

process

Projection of umbilicus

lliac

fossa

Pubic crest

Pubic symphysis

Tubercle of

the iliac crest

Anterior _____ superior iliac spine

Inguinal ligament

Pubic tubercle

Costal

cartilages

The abdominal wall consists mainly of muscles but partly of bones:

A) The skeletal elements of the wall are:

1-The five lumbar vertebrae and their intervening

intervertebral discs

2-The superior expanded parts of the pelvic bones

3-Bony components of the inferior thoracic wall

including the costal margin, rib XII, the end of rib XI

and the xiphoid process

<u>Remember</u> that the **thoracic cavity** is different from **the thoracic cage**. The thoracic cage is the whole boney structure including ribs from 1-12 and the 12 thoracic vertebrae.

The diaphragm separates the thoracic cage into thoracic

cavity above and abdominal cavity below . Therefore, the thoracic cavity is part of the thoracic cage. The other part of the thoracic cage is to contain and protect some of <u>the abdominal organs</u> <u>such as the liver, spleen and part of the stomach</u>. In other words the thoracic cage provides protection not only for the organs in the thoracic cavity but also for some organs within the upper part of the abdominal cavity.

Lumber vertebrae

They are five in number. Each vertebra is made of:

1-Body

- 2- Vertebral arch
- 3- Pedicles that connect the body to the vertebral arch
- 4- The vertebral foramina (between the body, the arch

and the pedicles)

- **4** The body is *kidney shaped* (no articular facet)
- 4 The vertebral foramina are *triangular* in shape
- **4** The vertebral arch is made **of 7 processes**

The largest one is the *spine w*hich is directed backwards

The other remaining processes are:

Four articular; two superior and two inferior

Two transverse processes (NO articular facets)

4 The fifth lumbar vertebra articulates with the base of the sacrum at the

lumbosacral joint



Psoas and Iliacus Muscles

B) The muscular elements of the wall are:

Posteriorly



Planes of the abdomen

Based on two horizontal and two vertical planes the anterior

abdominal wall is divided into nine-regions.

- The superior horizontal plane (the subcostal plane) it is a transverse plane immediately inferior to the costal margins. Passes at the level of the body of <u>the third lumber</u> vertebra and **the costal cartilage of rib X (number 10).**
- The inferior horizontal plane (the intertubercular plane) it is a transverse plane which connects the tubercles of the <u>iliac crests</u>. (not the ASIS)
- The vertical planes pass from the midpoint of the clavicles Inferiorly (midclavicular point) to a point midway between the iliac spine and pubic symphysis (midinguinal point).

These four planes establish the topographical divisions in the nine-region organization. The following designations are used for each

region: Superiorly

1-The	right	hypoch	<u>hondrium</u>

2-The epigastric region

3-The left hypochondrium

In the middle

4-<u>The right flank (or right lumbar)</u>

5-The umbilical region,

<u>6-The left flank (or left lumber)</u>

Inferiorly

9-Left groin (or left iliac)

7-<u>The right groin (or right iliac)</u>

8-Pubic region







Anterior abdominal wall

2-The superficial fascia

The superficial fascia of the anterior abdominal wall is a layer of fatty connective tissue. It is usually a single layer above the umbilicus however below the umbilicus, it forms two layers:

1<u>- superficial fatty layer</u>

2-deeper membranous layer

Superficial layer_

Superficial fascia (**Camper's fascia**) contains fat It is continuous over the inguinal ligament with the superficial fascia of the thigh

Read only

Read only

and with a similar layer in the perineum.

Deep membranous layer

Deep layer of superficial fascia (Scarpa's fascia)

- 4 It is thin and membranous.
- Contains little or no fat.
- Inferiorly, it continues into the thigh, but just below the Inguinal ligament, it fuses with the deep fascia of the thigh (the **fascia lata**).



3-Muscles of the Anterior Abdominal Wall:

A-THE EXTERNAL OBLIQUE

Origin: from the outer surface of the lower 8 ribs

Direction of the fibers: *downwards, forwards and medially*

Insertion: by aponeurosis into

xiphoid process, linea alba, pubic crest, pubic tubercle and anterior superior iliac spine
Notice that the lower border of the aponeurosis of external oblique muscle (which extends between the anterior superior iliac spine and the pubic tubercle) is not attached inferiorly to any bones. It is instead folded backwards and upwards apon itself to form the inguinal ligament

B-INTERNAL OBLIQUE

Direction of the fibers: upwards, forwards and medially

C-TRANSVERSUS ABDOMINIS

Direction of the fibers: pass horizontally and forwards









8

The rectus sheath is a long fibrous sheath that encloses the rectus abdominis muscle and pyramidalis muscle (if present) and contains the anterior rami of the lower six thoracic nerves and the superior and inferior epigastric vessels and lymph vessels. It is formed mainly by the aponeuroses of the three lateral abdominal muscles



External oblique

Femoral artery and vein

Pubic tubercle



- Anterior superior Aponeurosis of iliac spine ternal oblique **4** Superficial inguinal ring: is a triangular opening in the external oblique aponeurosis lying just above Inguinal ligament Lacunar ligament
 - and medial to the pubic tubercle.

4-Fascia transversalis

The fascia transversalis is a thin layer of fascia that lines the transversus abdominis muscle and is continuous with a similar layer lining the diaphragm and the iliacus muscle.

5-Extraperitoneal Fat

The extraperitoneal fat is a thin layer of connective tissue that contains a variable amount of fat and lies between the fascia transversalis and the parietal peritoneum

6-Parietal Peritoneum

The walls of the abdomen are lined with parietal peritoneum. This is a thin serous membrane and is continuous below with the parietal peritoneum lining the pelvis.



Abdominal aorta

- The aorta enters the abdomen through the aortic opening of the diaphragm in front of the 12th thoracic vertebra
- It descends behind the peritoneum on the anterior surface of the bodies of the lumbar vertebrae.
- 4 At the level of the fourth lumbar vertebra, it divides into the two common iliac arteries
- 4 Branches

Three anterior visceral branches:

1- The celiac artery

2-Superior mesenteric artery

<u>3- Inferior mesenteric artery</u>

Three lateral visceral branches:

1-The suprarenal artery

2- Renal artery

3- Testicular or ovarian artery

Five lateral abdominal wall branches:

1-The inferior phrenic artery

2- Four lumbar arteries

Three terminal branches:

1-The two common iliac arteries

2- The median sacral artery



Anterior abdominal wall





Veins on the Posterior Abdominal Wall

Inferior Vena Cava

- The inferior vena cava conveys most of the blood from the body below the diaphragm to the right atrium of the heart
- It is formed by the union of the common iliac veins behind the right common iliac artery at the level of the fifth lumbar vertebra
- It ascends on the right side of the aorta, pierces the central tendon of the diaphragm at <u>the level of the eighth thoracic vertebra</u>, and drains into the right atrium of the heart.

The inferior vena cava has the following tributaries



- Two anterior visceral tributaries: the hepatic veins
- Three lateral visceral tributaries: the right suprarenal vein (the left vein drains into the left renal vein), renal veins, and right testicular or ovarian vein (the left vein drains into the left renal vein)
- Five lateral abdominal wall tributaries: the inferior phrenic vein and four lumbar veins
- Three veins of origin: two common iliac veins and the median sacral vein

Portal Vein (Hepatic Portal Vein)

• The portal vein drains blood from the abdominal part of the gastrointestinal tract from the lower third of the esophagus to halfway down the anal canal; it also drains blood from the spleen, pancreas, and gallbladder. The portal vein enters the liver and breaks up into sinusoids, from which blood passes into the hepatic veins that join the inferior vena cava. The portal vein is about 2 in. (5 cm) long and is formed behind the neck of the pancreas by the union of the superior mesenteric and splenic veins .

Important



