

ANTERIOR ABDOMINAL WALL

Competency no. AN 44.1, 44.2, 44.3, 44.6, 44.7

By-Dr Shashi Munjal

Specific learning objectives

AN 44.1 Describe: **Regions & Quadrants** of Abdomen

Lateral vertical, Transpyloric , Transtubercular and **Subcostal** planes
Linea Alba and **Linea Semilunaris** lines of Abdomen

AN 44.2 Describe anterior abdominal wall: 1. **Fascia**, 2. **Nerves** & 3. **Blood vessels**

AN 44.6 Describe attachments of **Muscles** of Anterior Abdominal wall

AN 44.3 Describe the formation of **Rectus Sheath** and its contents

AN 44.7 Enumerate common **Abdominal Incisions**

The abdomen can be divided into **Nine Arbitrary Regions** by :

Two horizontal planes

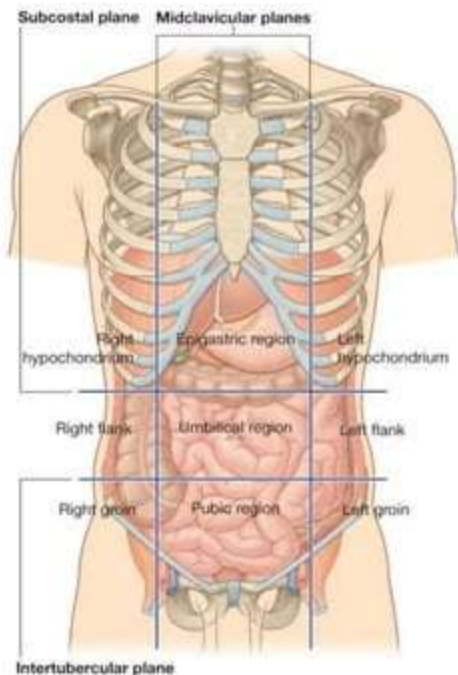
Subcostal and Transtuberular planes

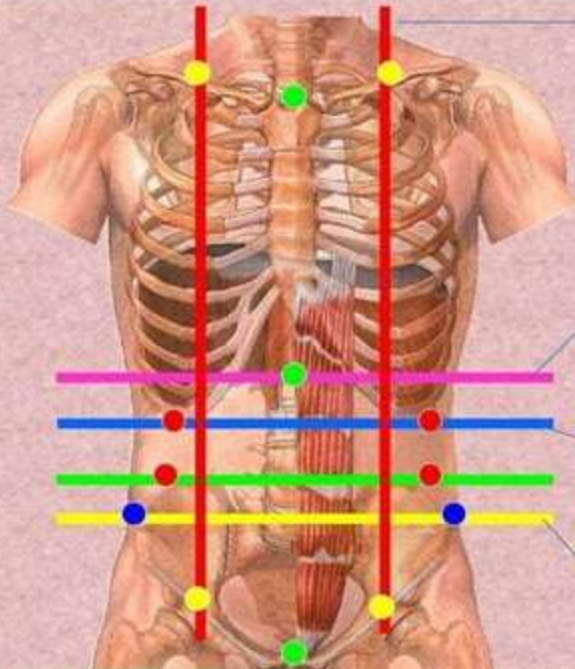
and Two vertical planes

Right & Left Mid Clavicular Planes

projected onto the surface of the body

- The **Nine regions** thus formed are:
- **Epigastrium;**
- **Right and Left Hypochondrium;**
- **Central or Umbilical;**
- **Right and Left Lumbar;**
- **Hypogastrium or Suprapubic;**
- **Right and Left Iliac Fossa.**





The lateral vertical plane

A vertical line drawn from the **midclavicular point** to the **midinguinal point**

The transpyloric plane

It is a transverse line drawn midway between the **suprasternal notch** & the **symphysis pubis**

The subcostal plane

It is a transverse line drawn between the **lowest points of the costal margin**

The intertubercular plane

a transverse line drawn between the **2 tubercles of the 2 iliac crests**

The body planes

LINEA ALBA AND LINEA SEMILUNARIS

- It is the raphae formed due to the interlacing of the abdominal wall muscle aponeurosis of right and left side of abdominal wall



The aponeuroses of three flat muscles seem to end in the fibrous raphe- **linea alba**.

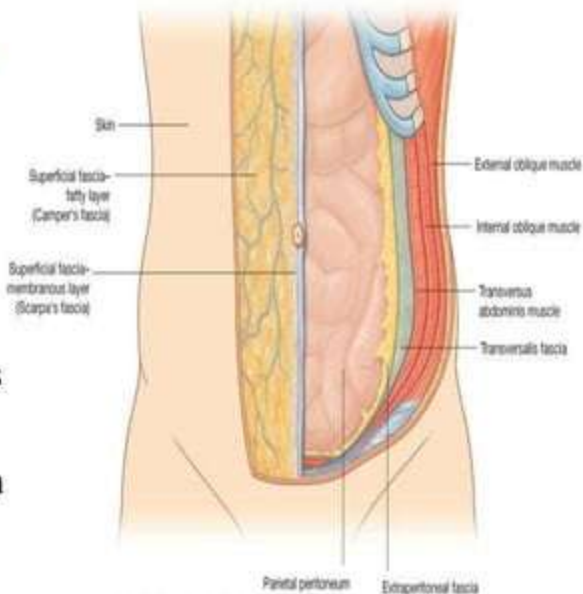
It is the semilunar line at the lateral margin of rectus abdominis muscle extending from the tip of 9th costal cartilage to pubic tubercle.



Layers of Anterior Abdominal Wall

The anterior abdominal wall is made up of :

1. Skin
2. Superficial fascia
3. Muscles
4. Fascia transversalis
5. Extraperitoneal fat
6. Parietal peritoneum



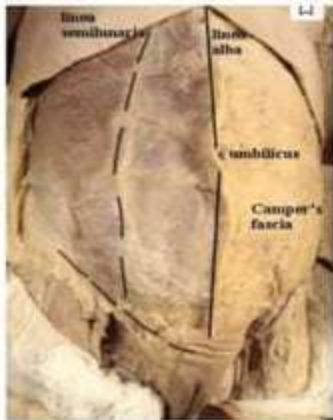
Superficial Fascia

The **Superficial Fascia** of the anterior abdominal wall **Below the level of the umbilicus**, is divided into a superficial fatty layer (**Fascia of Camper**) and a deep membranous layer (**Fascia of Scarpa**).

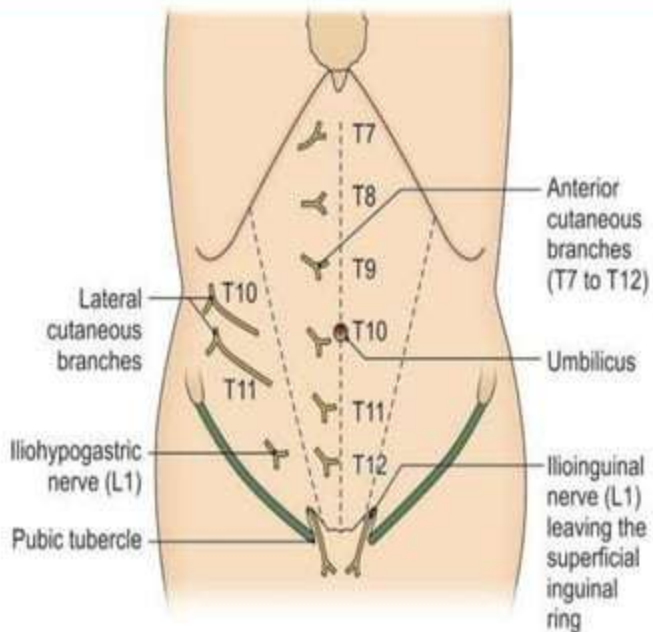
The various contents of the superficial fascia run between these two layers.

The fatty layer is continuous with the superficial fascia of the adjoining part of the body.

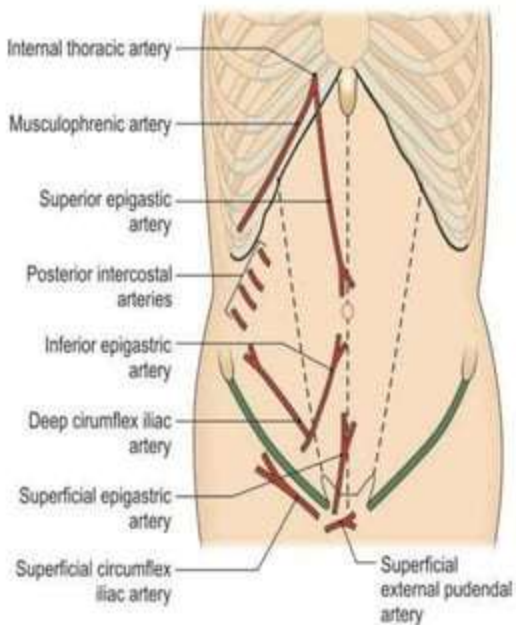
The membranous layer is continuous below with a similar membranous layer of superficial fascia of the perineum known as **Colles' fascia**.



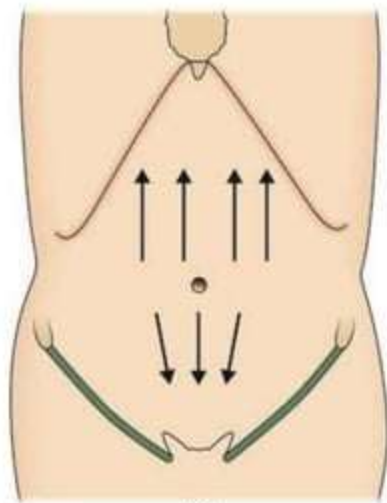
The cutaneous nerves of the anterior abdominal wall



Arteries of the anterior abdominal wall



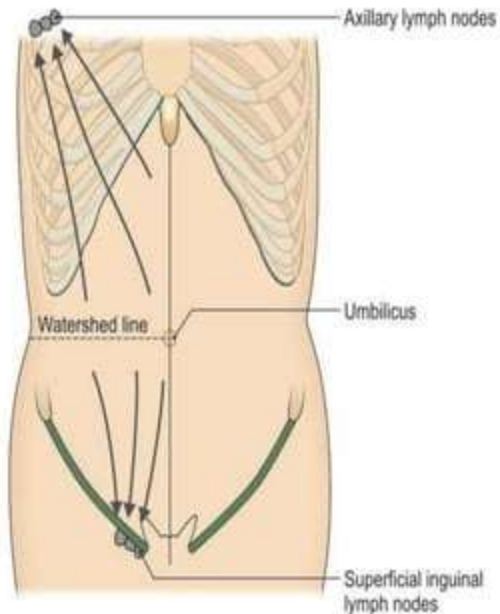
The subcutaneous venous circulation
in: Normal subjects,



(a)

Superficial Lymphatics

Above the level of the umbilicus the lymphatics run upwards to drain into the axillary lymph nodes. Below the level of the umbilicus they run downwards to drain into the superficial inguinal lymph nodes.



MUSCLES OF THE ANTEROLATERAL ABDOMINAL WALL

On either side of the midline, there are four large muscles.

These are the

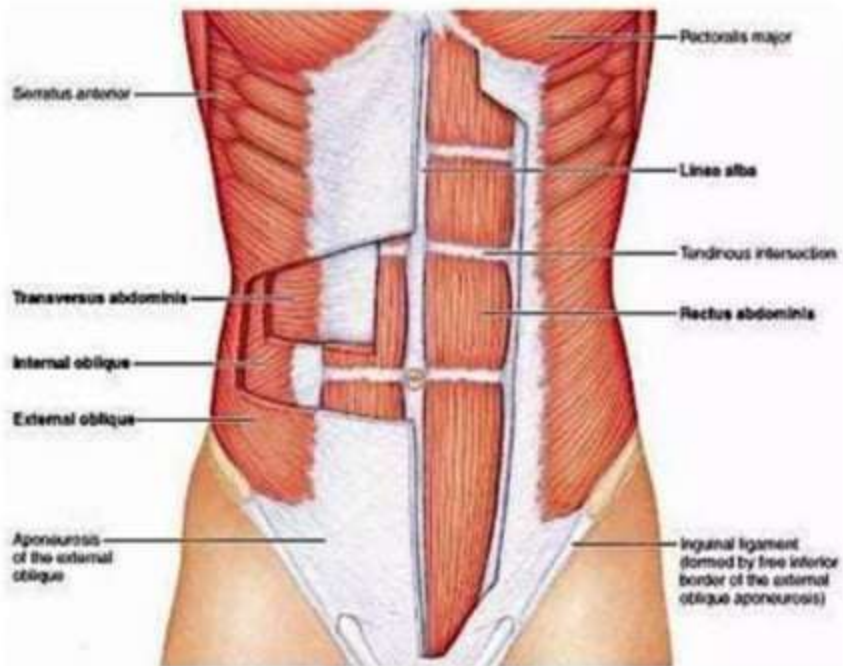
External Oblique,

Internal Oblique,

Transversus abdominis

Rectus Abdominis.

Two small muscles, the Pyramidalis, conjoint tendon are also present.



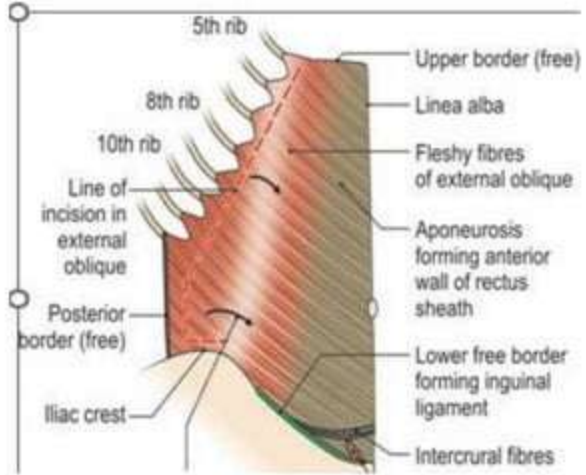
External Oblique Muscle Origin

The muscle arises by eight fleshy slips from the outer surfaces of the shaft of the lower eight ribs. The fibres run downwards, forwards and medially

Insertion

Most of the fibres of the muscle end in a broad aponeurosis through which they are inserted into the xiphoid process, linea alba, Pubic symphysis, pubic crest & pectineal line

The lower fibres of the muscle are inserted directly into the anterior two-thirds of the outer lip of the iliac crest. Between the ASIS & pubic tubercle the aponeurosis has a free inferior border that is folded on itself to form the inguinal ligament.



Internal Oblique Muscle

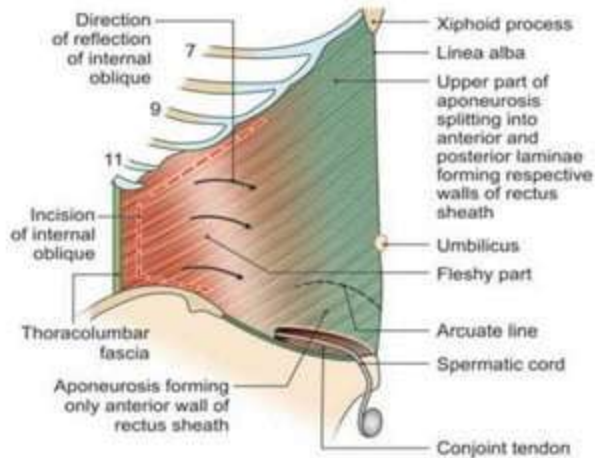
Origin

From lateral 2/3 of inguinal Ligament, anterior 2/3 of intermediate area of the iliac crest and Thoracolumbar fascia.

Insertion

The uppermost fibres are inserted directly into the lower three or four ribs and their cartilages.

The greater part of the muscle ends in an aponeurosis through which it is inserted into the seventh, eighth and ninth costal cartilages, the xiphoid process, linea alba, pubic crest and the pectineal line of the pubis. It does not extend beyond the costal margin.



Other Points of insertion of Internal oblique

In the upper 3/4th of the wall, the aponeurosis splits into an anterior lamina that passes medially in front of the rectus abdominis; and a posterior lamina that lies behind the rectus.

Below a level midway between the umbilicus and the pubic symphysis (lower 1/4th of the wall) the aponeurosis remains a single layer. It passes in front of rectus abdominis to reach linea alba.

Its lower free crescent shaped border is the Arcuate line

It is also modified to form:

- The conjoint tendon
- The cremaster muscle

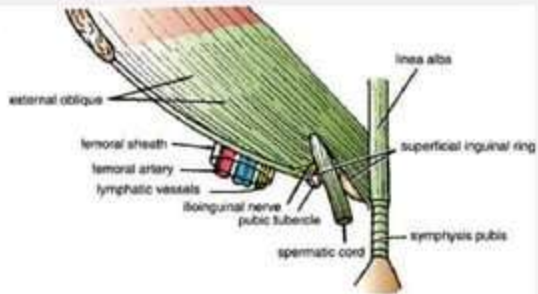
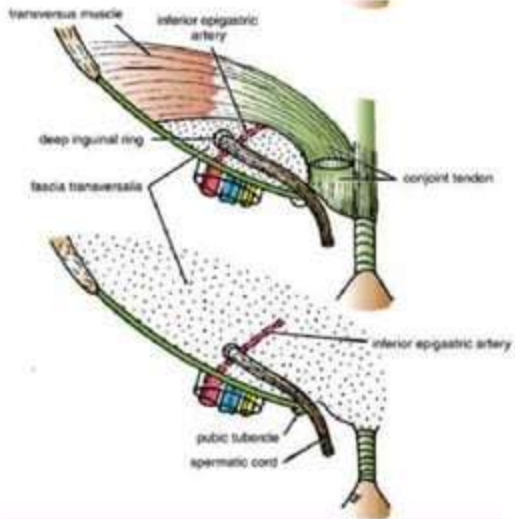
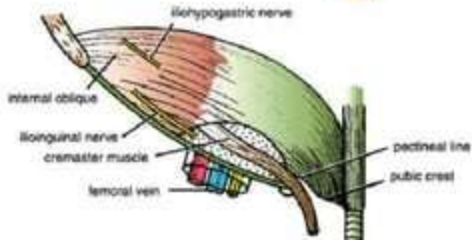
Other Points of Insertion of Transversus abdominis

The aponeurosis of the transversus abdominis takes part in forming the rectus sheath as follows:

Above the level of the arcuate line (upper 3/4th), the aponeurosis passes medially behind the rectus abdominis muscle along with the posterior lamina of the internal oblique aponeurosis.

The lower edge of this part of the aponeurosis helps to form the arcuate line along with internal oblique muscle.

Below the level of the arcuate line the aponeurosis passes in front of the rectus abdominis and helps to form the anterior wall of the rectus sheath.

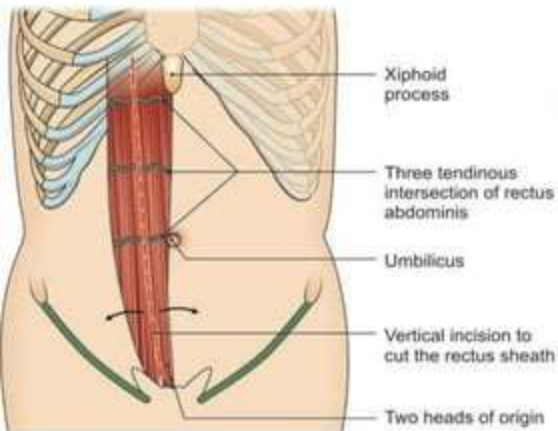
A**B**

Rectus Abdominis Muscle

Origin The muscle arises by two tendinous heads as follows.

1. Lateral head from the lateral part of the pubic crest.
2. Medial head from the medial part of pubic crest and anterior pubic ligament.

The fibres run vertically upwards.



Insertion On the front of the wall of the thorax, along a horizontal line passing laterally from the xiphoid process, and cutting in that order, the 7th, 6th and 5th costal cartilages.

Tendinous intersections: These are three transverse fibrous bands which divide the muscle into smaller parts. One lies opposite the umbilicus. Second opposite the free end of the xiphoid process. Third in between the two.

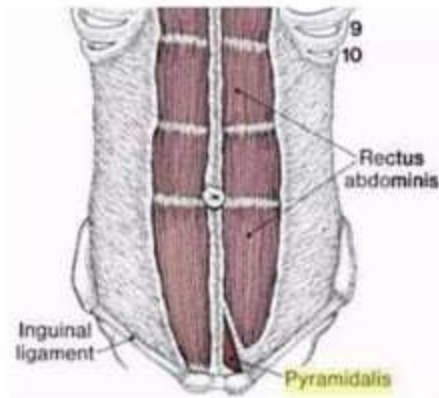
Pyramidalis

Inconsistent muscle,
within rectus sheath

Origin: pubic symphysis
and pubic crest

Insertion: linea alba

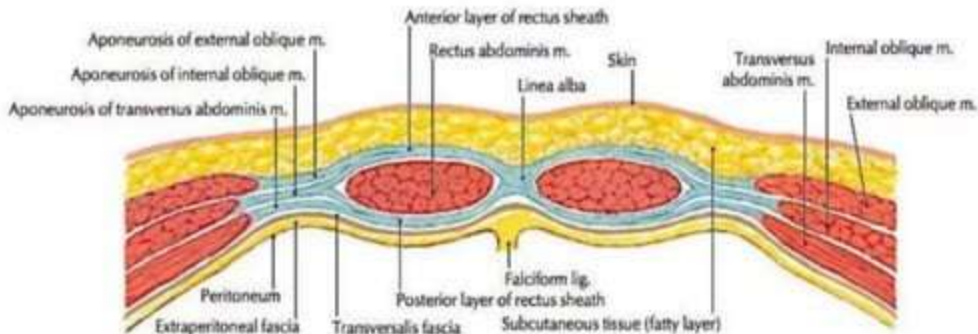
Nerve supply: T12



Rectus Sheath

The rectus sheath is the durable, resilient, fibrous compartment that covers the rectus abdominis muscle as an enclosed sheath.

It is formed mainly by the aponeuroses of the three flat muscles of the abdominal wall i.e. External Oblique, Internal Oblique and the Transversus abdominis muscle



Rectus sheath is firmly adherent to the tendinous intersections of the rectus muscle. And has two walls, anterior and posterior.

Anterior Wall

It is complete, covering the muscle from end to end. Its composition is variable.

Above the costal margin

Only External oblique

Between costal margin and arcuate line

External oblique and upper lamina of Internal Oblique

Below arcuate line

External oblique, Internal Oblique & Transversus abdominis

Posterior Wall

It is incomplete, being deficient Above the costal margin

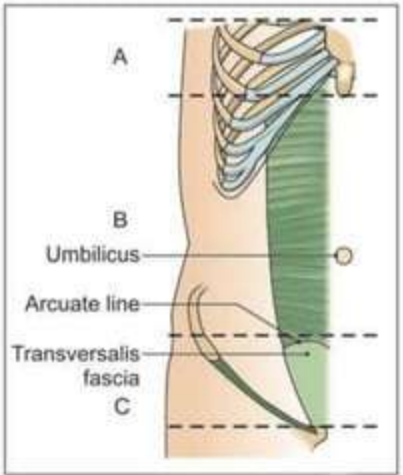
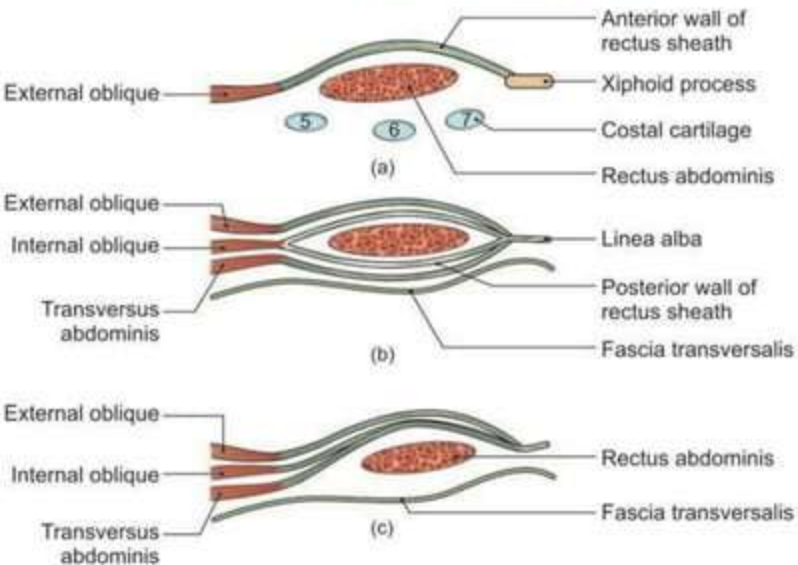
where the rectus muscle rests directly on the 5th, 6th and 7th costal cartilages.

and Below the arcuate line Only the Fascia Transversalis forms the Post. wall

Between costal margin and arcuate line External oblique, Lower lamina of Internal Oblique and whole of the Transversus abdominis

Transverse sections through the rectus abdominis, and its sheath:

(a) Above the costal margin, A of inset, (b) Between costal margin and arcuate line, B of inset and (c) Below arcuate line, C of inset



Contents

Muscles

Rectus abdominis

Arteries

Superior epigastric artery

Inferior epigastric artery

Veins

The superior epigastric venae comitantes

The inferior epigastric venae comitantes

Nerves

These are the terminal parts of the lower six thoracic nerves, including the lower five intercostal nerves and the subcostal nerves.

INCISIONS

- Surgical incision
- is a cut made through the skin
- to facilitate an operation or procedure

Abdominal & Pelvic incisions

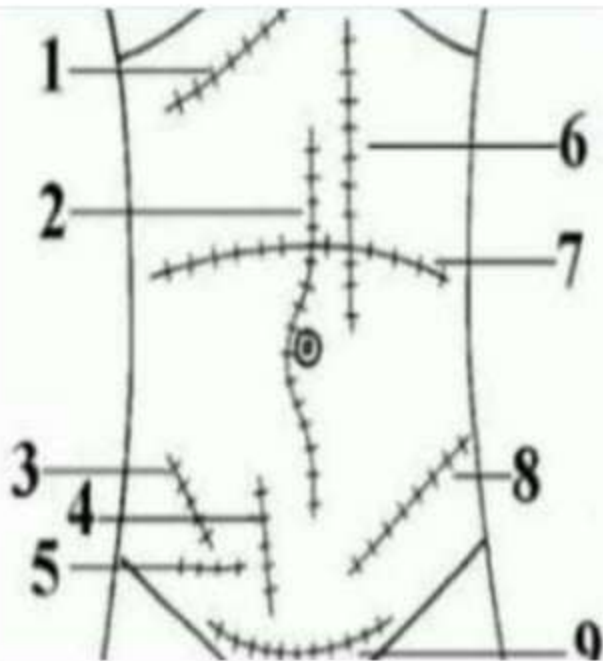
➤ Vertical Incisions

- Midline
- Paramedian

➤ Transverse & Oblique Incisions

- Kochler Subcostal Incision
- Transverse Muscle Dividing
- McBurney Incisions
- Oblique Muscle cutting
- Pfannenstiel Incision
- Maylard Incision

- 1)Kocher
- 2)Median
- 3)McBurney
- 4)Battle
- 5)Ianz
- 6)Paramedian
- 7)Transverse
- 8)Rutherford Morrison
- 9)Pfannensteil



The umbilicus

It is the normal scar in the anterior abdominal wall formed by the remnants of the root of the **Umbilical cord**.

In the lymphatic and venous drainage, the level of the umbilicus is a **watershed**.

The skin around the umbilicus is supplied by **segment T10** of the spinal cord.

The umbilicus is one of the important sites at which tributaries of the portal vein anastomose with systemic veins (**Portocaval anastomoses**).

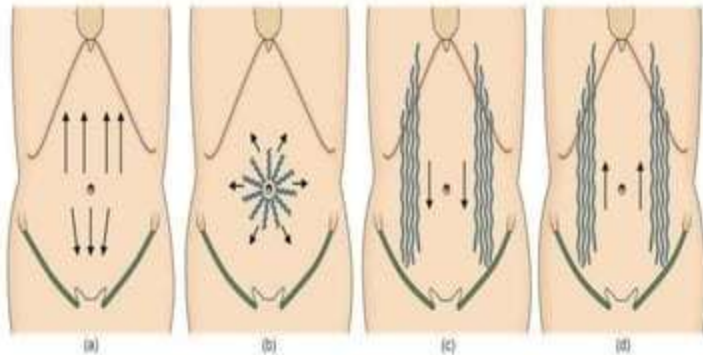
Umbilicus is the meeting point of the **Four folds**

(two lateral, head and tail) of embryonic plate.

This is also the meeting point of **Three systems**, namely

the **Digestive** (**vitellointestinal duct**), the **Excretory** (**urachus**), and **Vascular** (**umbilical vessels**).

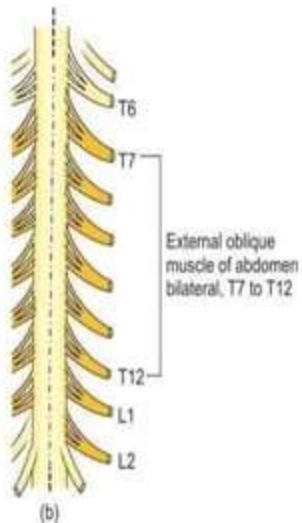
The subcutaneous venous circulation in: (a) Normal subjects, (b) portal obstruction showing caput medusae, (c) superior vena caval obstruction, and (d) inferior vena caval obstruction (arrows indicate the direction of blood flow)



Nerve Supply of

External oblique muscle

Lower six thoracic nerves



Nerve Supply of
Internal Oblique muscle
&
Transversus abdominis

Lower six thoracic nerves
and the first lumbar nerve.

