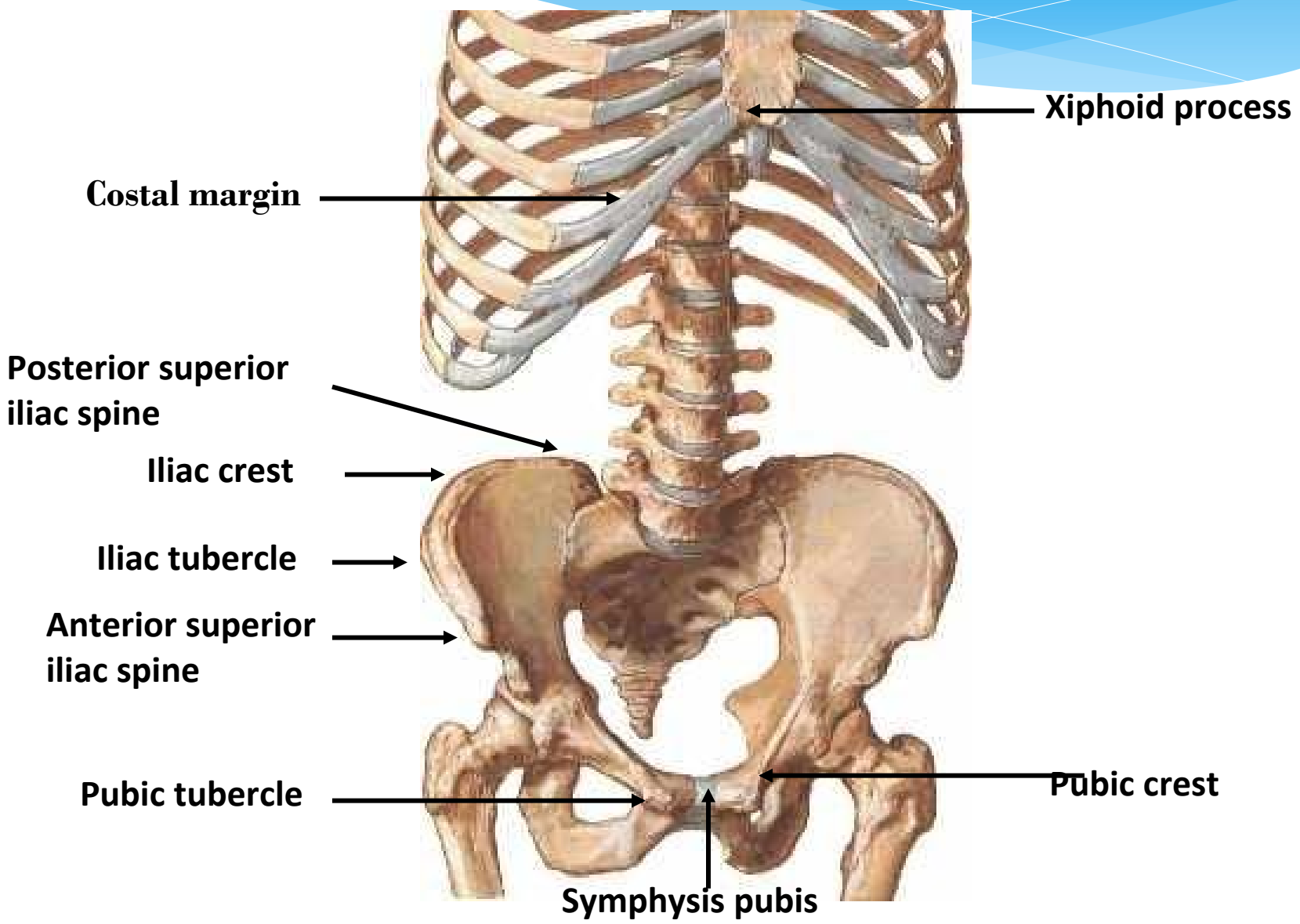
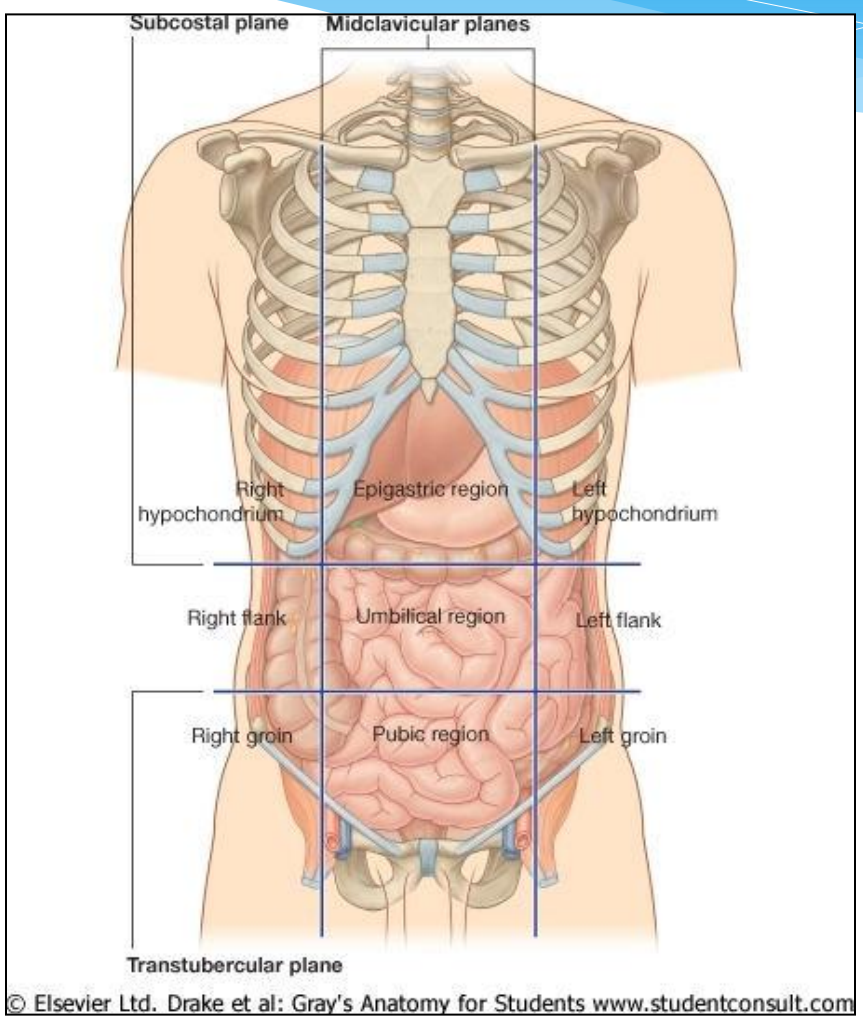
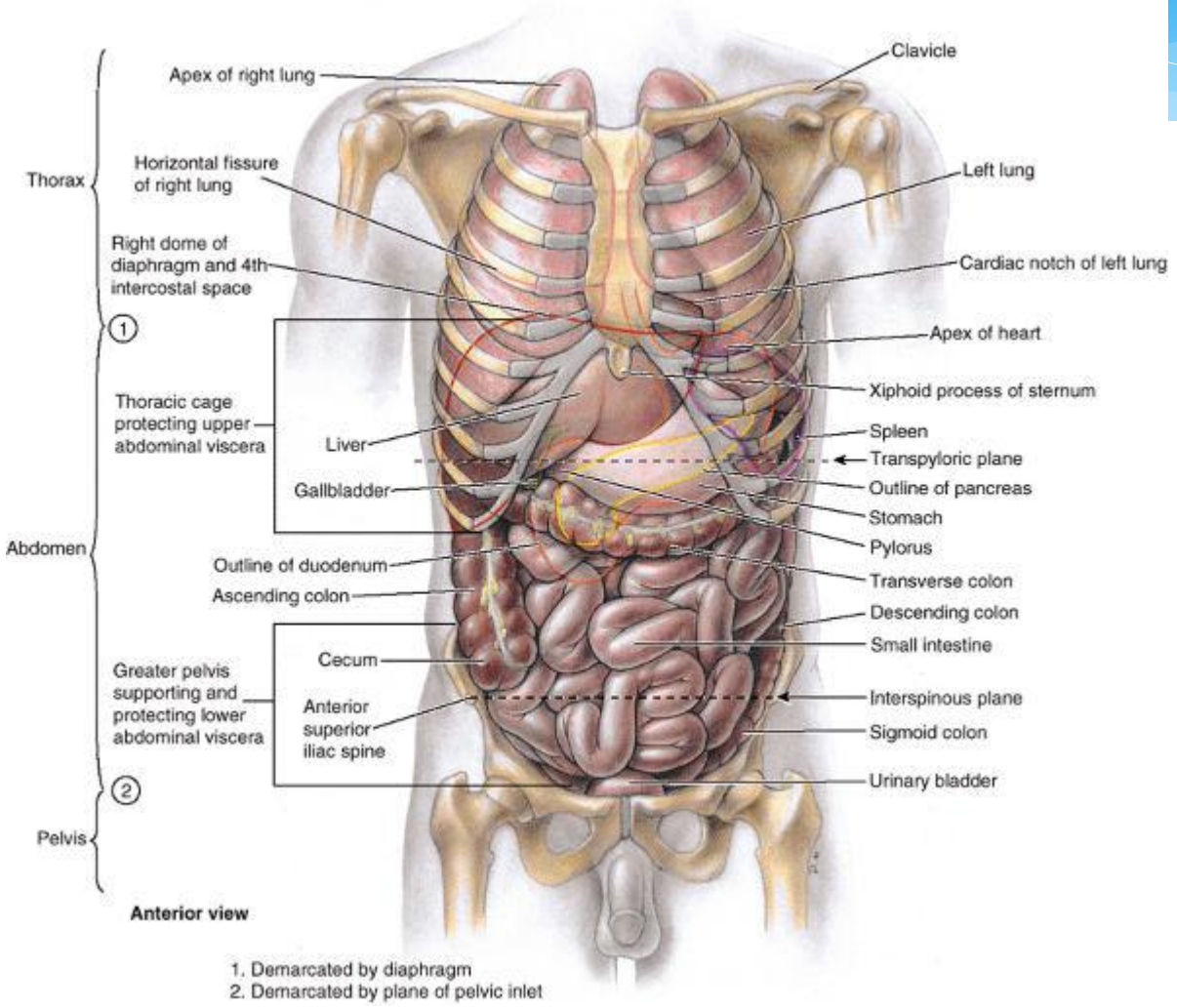






Body Regions

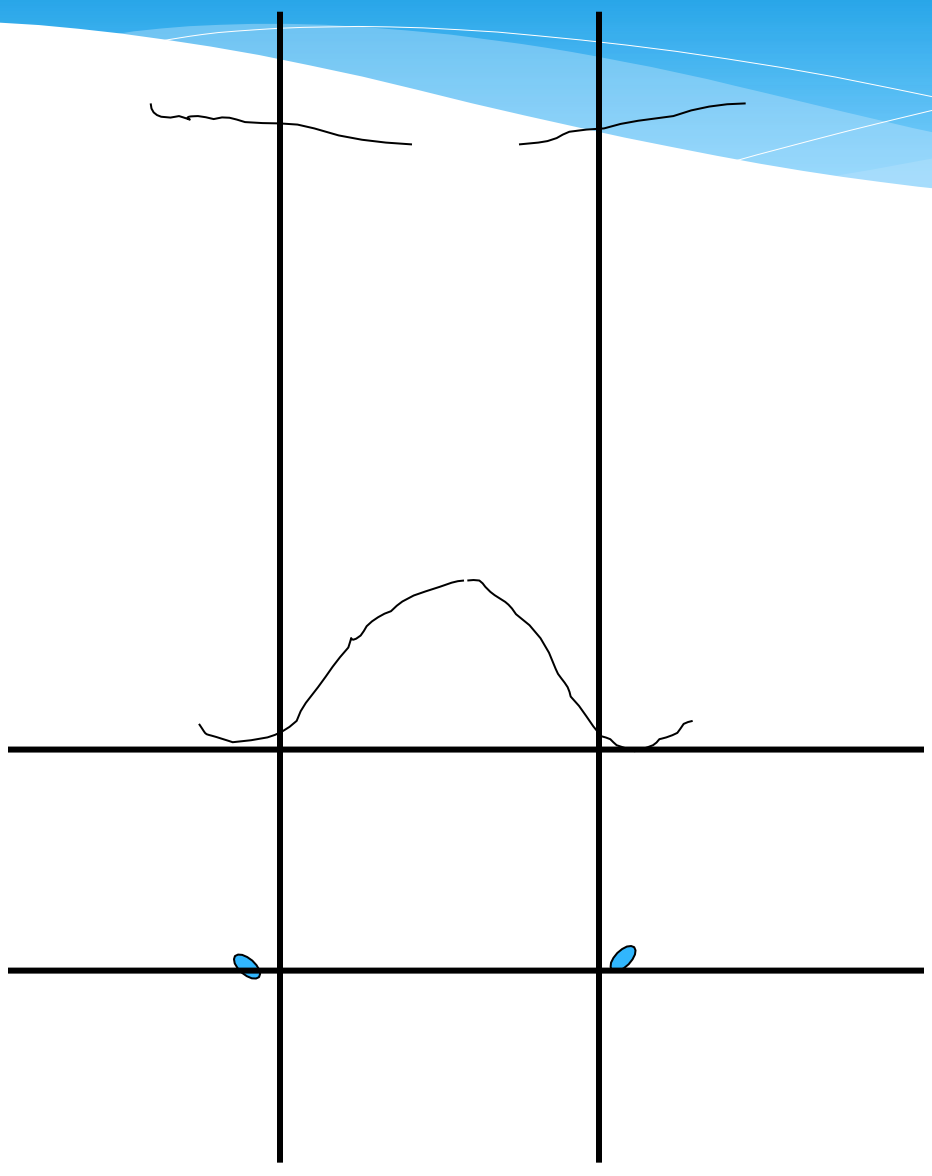
* Imaginarily divided into 9 regions
* Midline sections:
  * Epigastric = above stomach
  * Umbilical = umbilicus or navel
  * Hypogastric = below the stomach

Body Regions (con't)

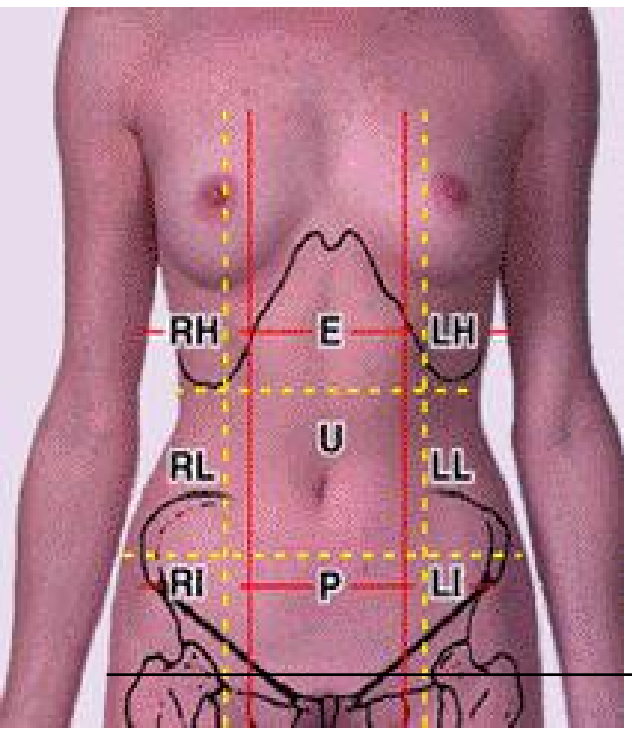
* **Lateral sections:**
  * Right and left hypochondriac
  * Positioned near ribs, specifically cartilages
* **Right and left lumbar**
  * Positioned near small of back (lumbar region)
* **Right and left iliac**
  * Named for upper bone of hip (ilium)
  * Also called inguinal region (referring to groin)

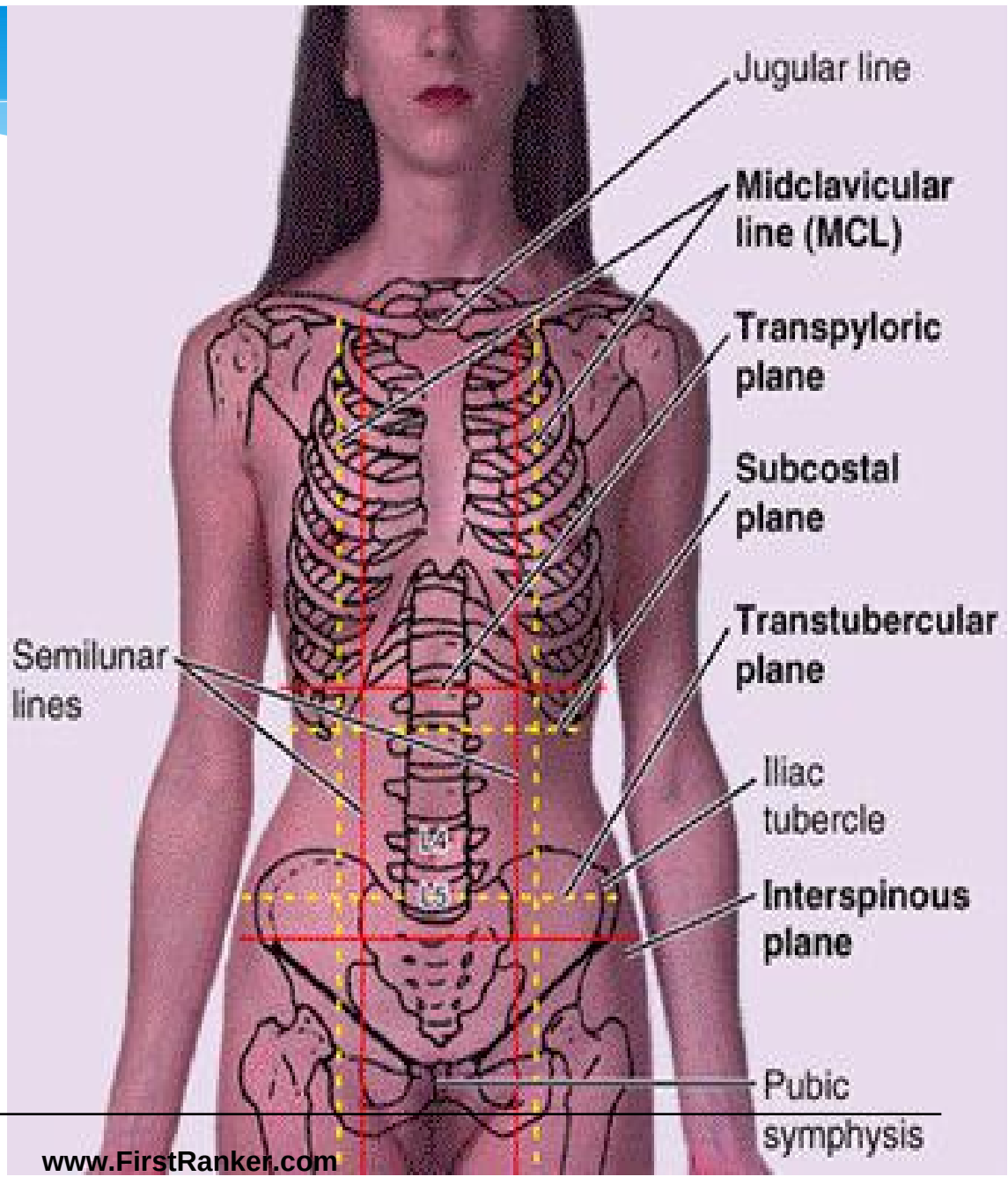
Body Positions

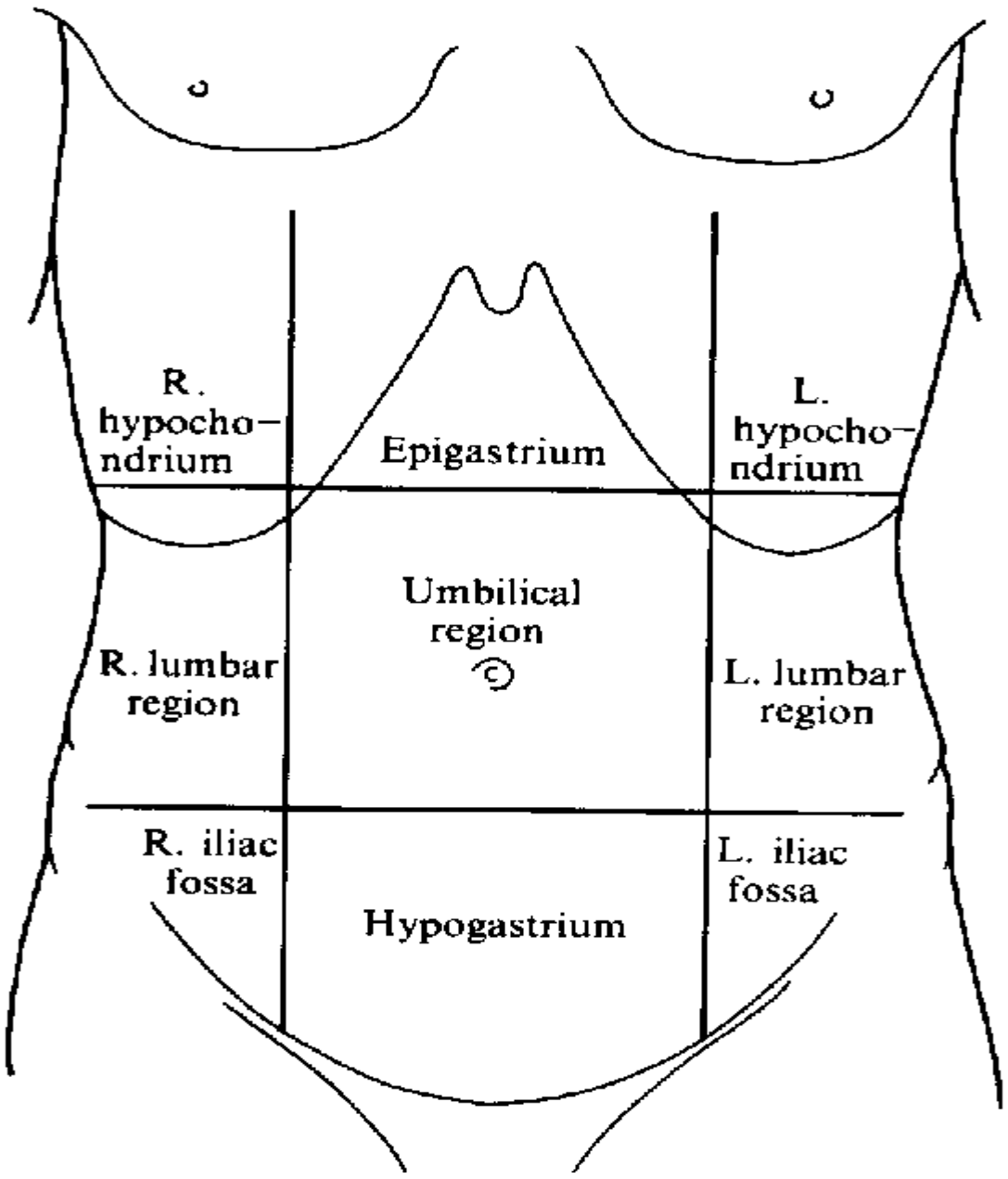
* Anatomical
  * Standing erect, facing forward, arms at sides, palms forward, toes pointed forward
* Prone
  * Lying face down
* Supine
  * Lying face up



Key	
Abdominal Regions:	
RH	Right hypochondriac
RL	Right lateral (lumbar)
RI	Right inguinal (groin)
E	Epigastric
U	Umbilical
P	Pubic (hypogastric)
LH	Left hypochondriac
LL	Left lateral (lumbar)
LI	Left inguinal (groin)
Abdominal Quadrants:	
RUQ	Right upper quadrant
LUQ	Left upper quadrant
RLQ	Right lower quadrant
LLQ	Left lower quadrant





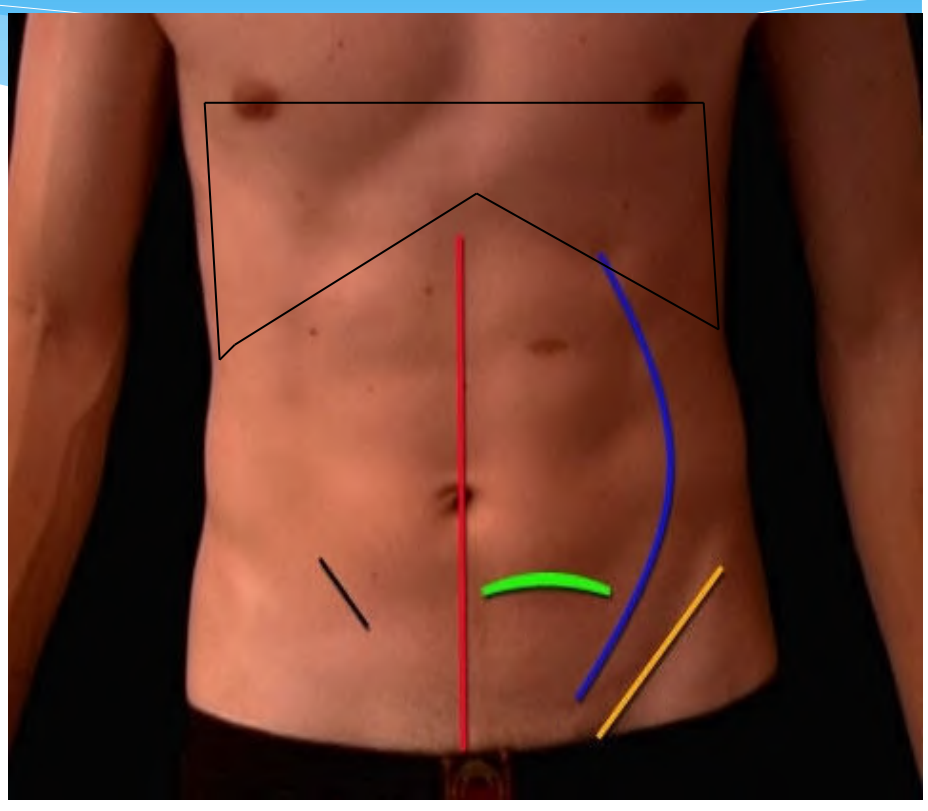


Related anatomy

* **Thoraco-abdomen:**

Upper border= nipple (anterior), scapular tip (posterior)

Lower border= inferior costal margin



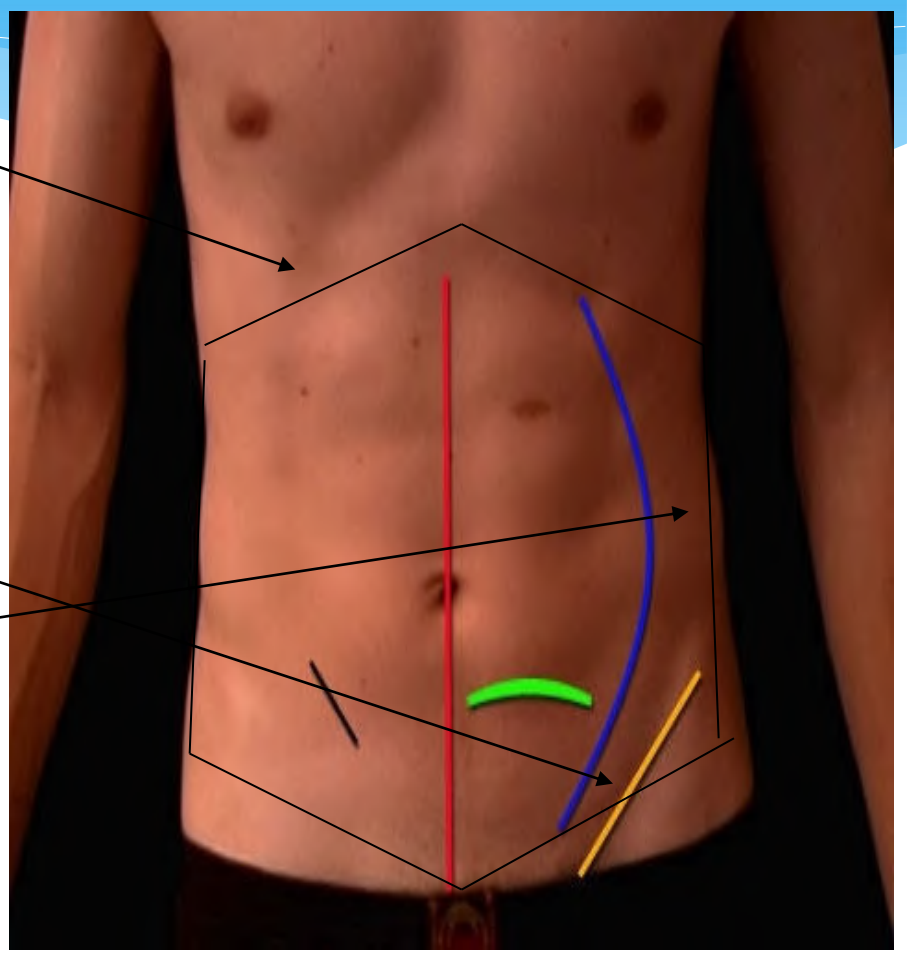
Related anatomy

* **Anterior abdomen:**

Upper border=anterior costal margin

Lower border=inguinal crease

Lateral border=anterior axillary's line



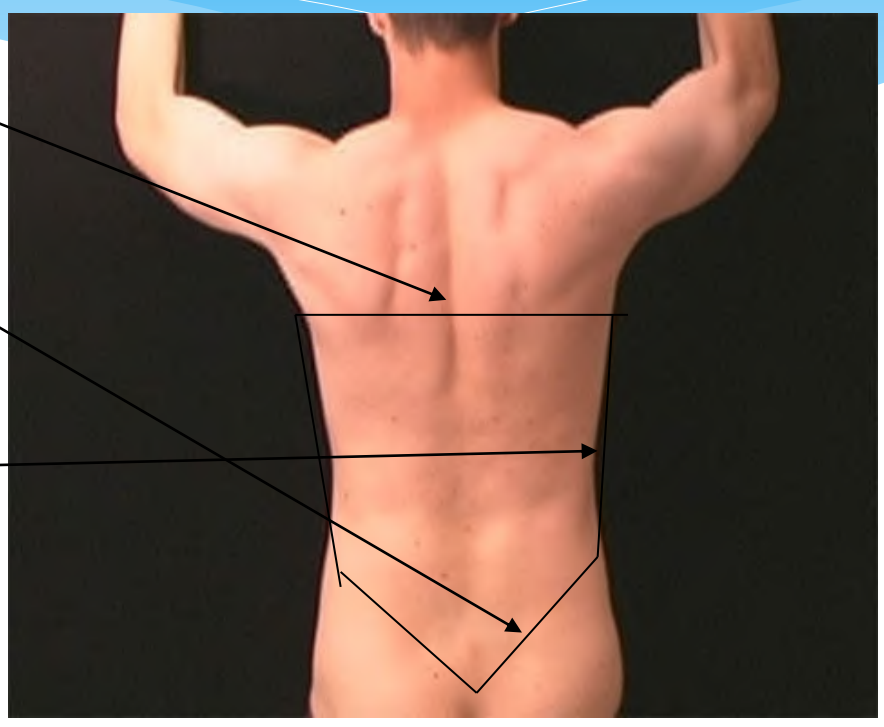
Related anatomy

* **Back:**

Upper border=scapular tip

Lower border=iliac crest

Lateral border= posterior axillary line

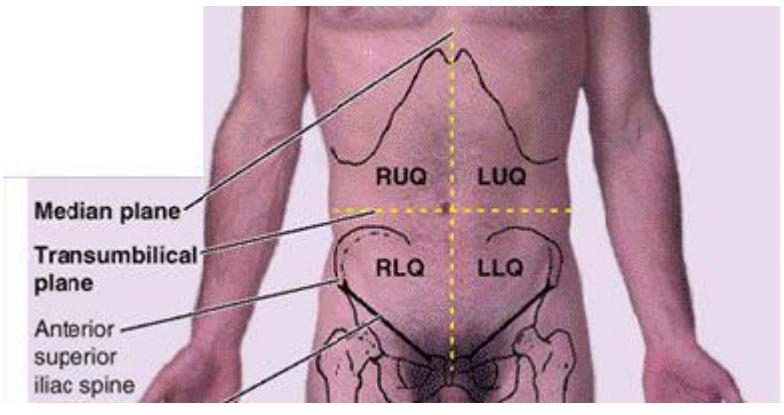


Right upper quadrant (RUQ)

Liver: right lobe
Gallbladder
Stomach: pylorus
Duodenum: parts 1-3
Pancreas: head
Right suprarenal gland
Right kidney
Right colic (hepatic) flexure
Ascending colon: superior part
Transverse colon: right half

Left upper quadrant (LUQ)

Liver: left lobe
Spleen
Stomach
Jejunum and proximal ileum
Pancreas: body and tail
Left kidney
Left suprarenal gland
Left colic (splenic) flexure
Transverse colon: left half
Descending colon: superior part



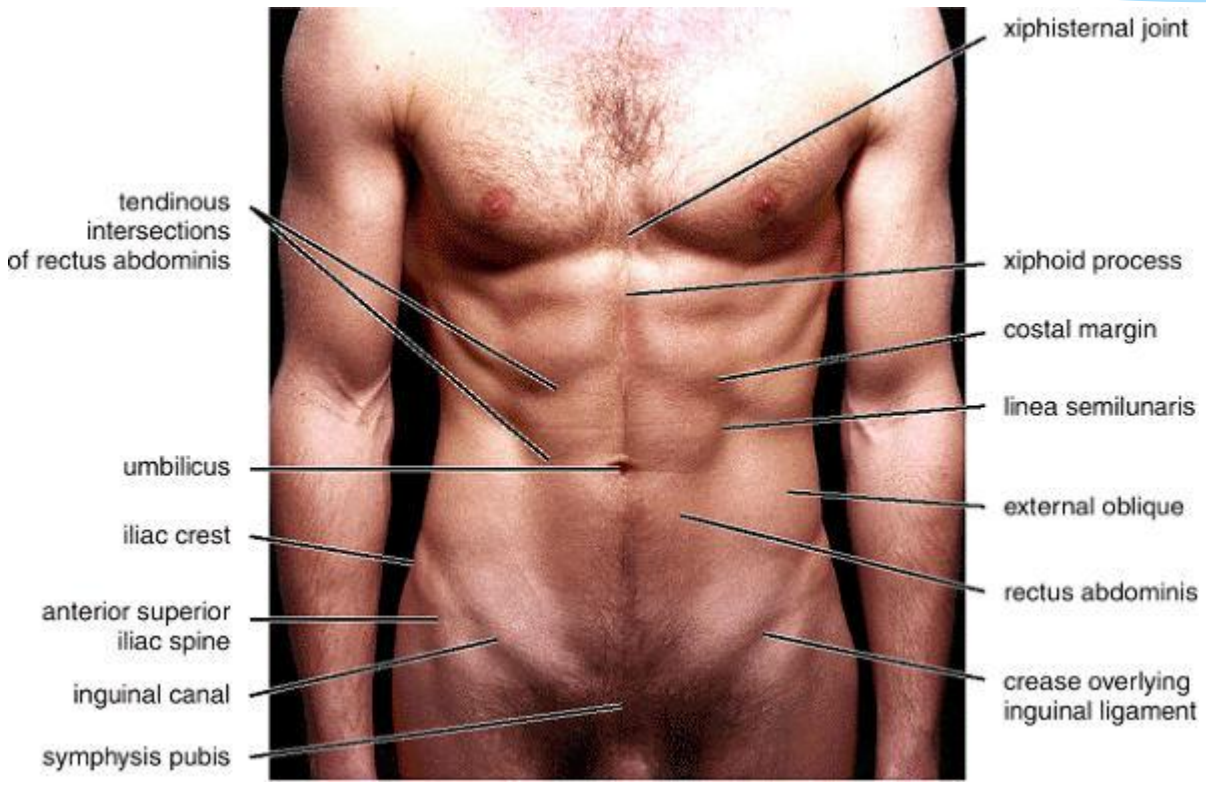
Right lower quadrant (RLQ)

Cecum
Vermiform appendix
Most of ileum
Ascending colon: inferior part
Right ovary
Right uterine tube
Right ureter: abdominal part
Right spermatic cord: abdominal part
Uterus (if enlarged)
Urinary bladder (if very full)

Left lower quadrant (LLQ)

Sigmoid colon
Descending colon: inferior part
Left ovary
Left uterine tube
Left ureter: abdominal part
Left spermatic cord: abdominal part
Uterus (if enlarged)
Urinary bladder (if very full)

Soft tissue land marks (Snells')



THE ANATOMY of abdominal incision

Definition: incision defined as cut made with knife for surgical purposes.

Types of abdominal incision:

The abdominal incisions are classified into:~

① Vertical abdominal incision
② Transverse abdominal incision
③ Oblique abdominal incision
④ Abdomino thoracic incision

The vertical incisions:

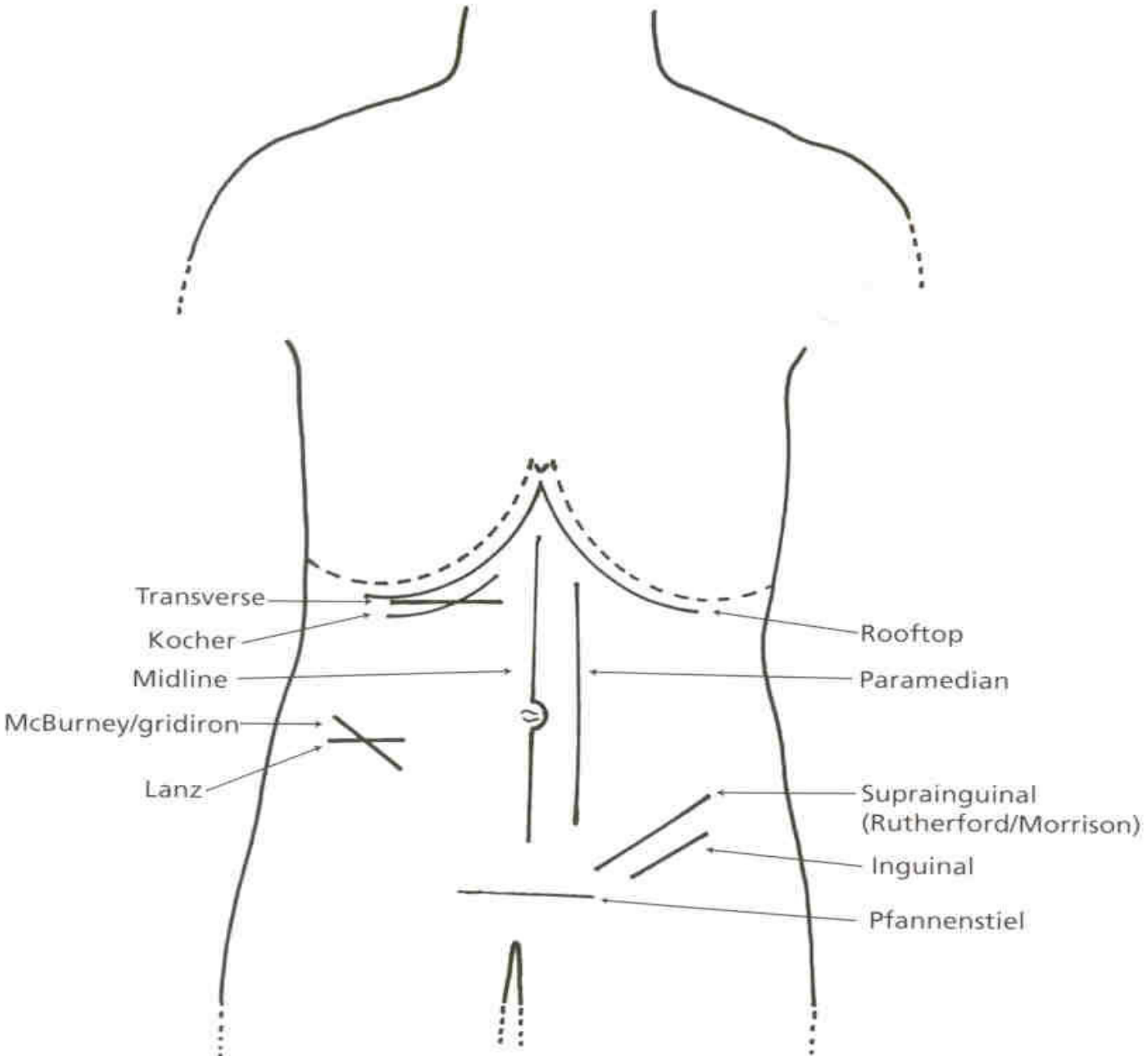
- Midline incision
- Para median

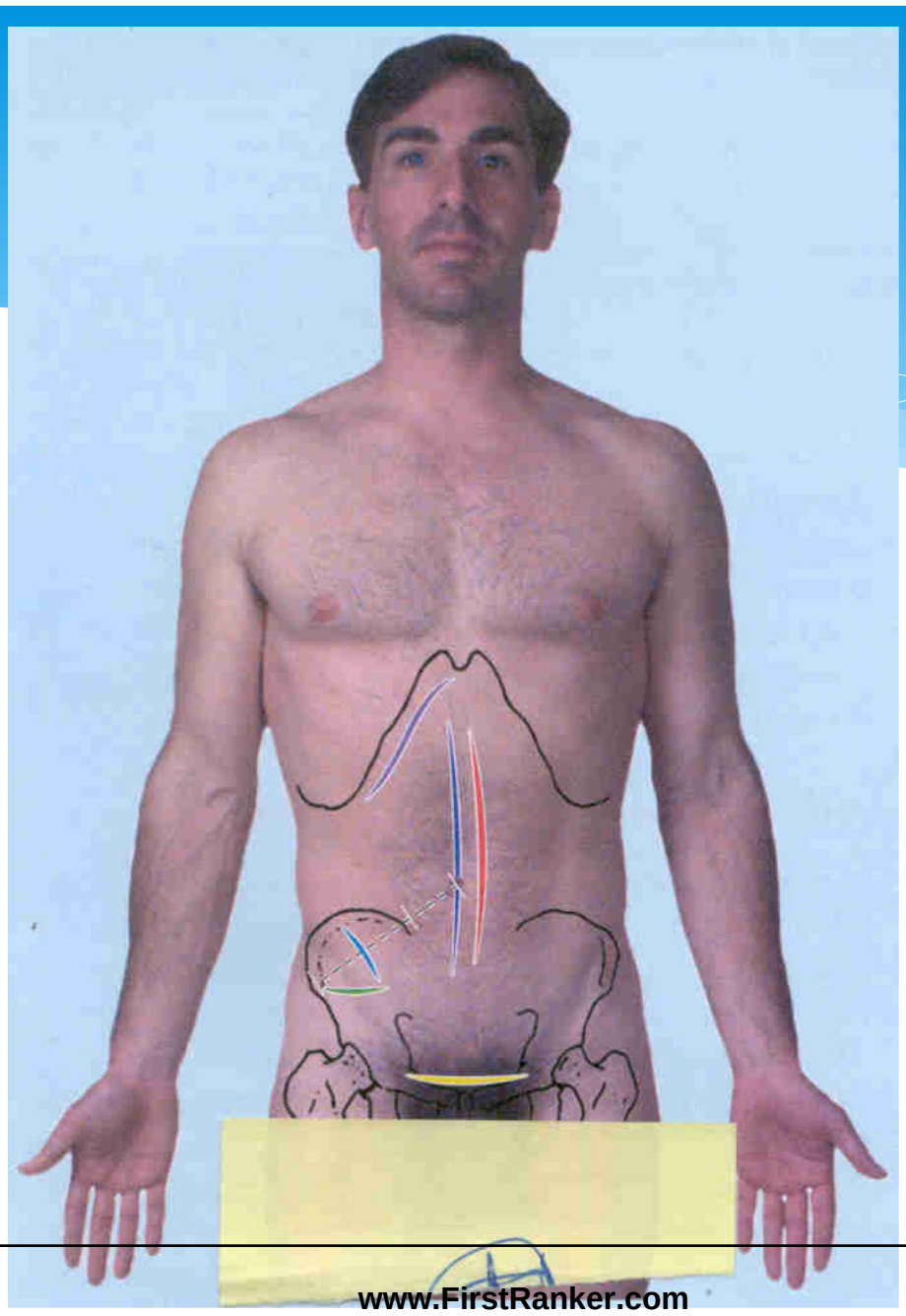
The transverse abdominal incisions:

- Upper and lower transverse incision
- Pfannenstiel incision
- LANZ incision for appendicectomy

The oblique abdominal incisions

- The subcostal or Kocher's incision
- Rutherford Morison incision
- McBurney incision for appendicectomy





THE APPLIED ANATOMY of abdominal incision

Abdominal cavity can be approached through numerous incisions but only correct diagnosis will enable surgeon to choose correct incision.

1. When the pre-operative diagnosis is reasonably certain incision may be chosen with confidence.
2. Laparotomy for undiagnosed abdominal disease is most usefully approached through vertical incision equidistant above and below the umbilicus and once the diagnosis confirmed, incision may be enlarged in an upward or downward direction.
3. Choice of incision depends on many factors these includes:–
   - The organs to be investigated
   - The type of surgery to be preformed
   - Whether speed is an essential consideration
   - The build of the patient
   - The degree of obesity
   - The presence of previous abdominal incisions
4. Closure of the abdominal incision:–

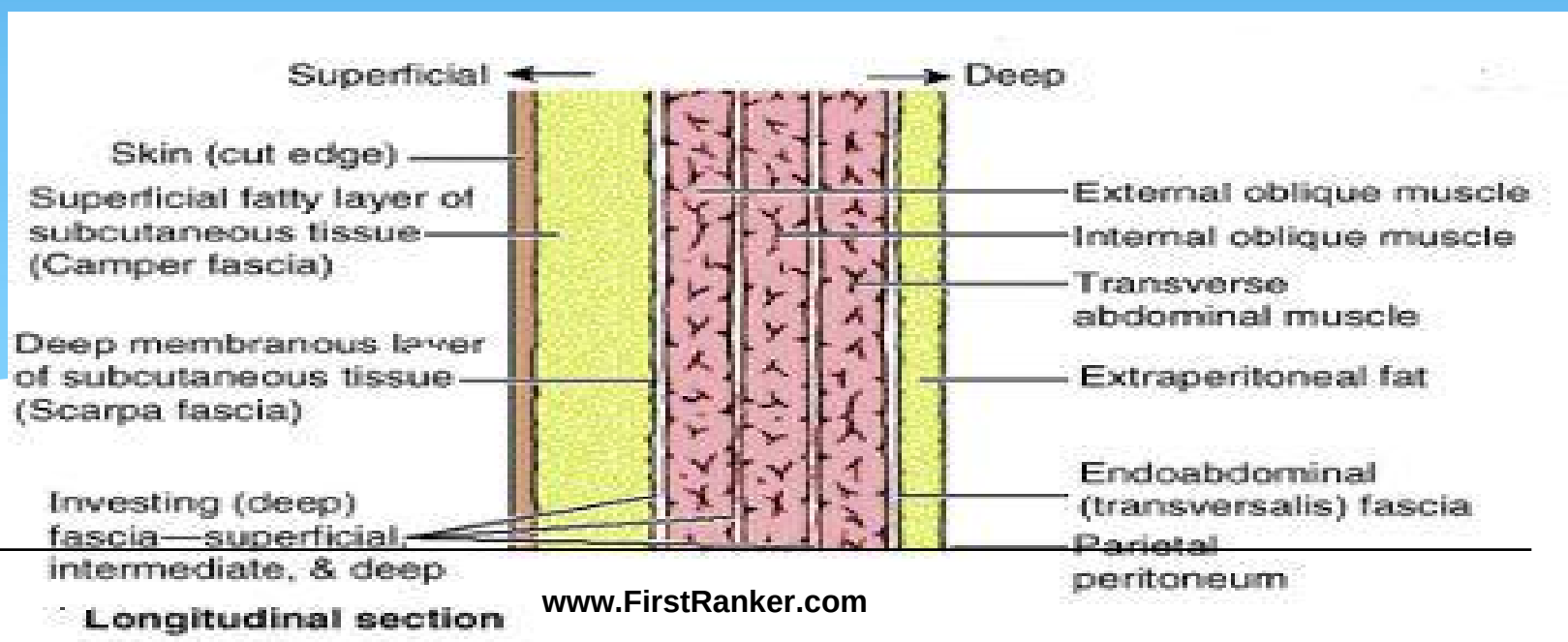
   The ideal method of abdominal wound closure has not been discovered. However it should be free from complications such as:-

- Burst abdomen
- Incisional hernia
- Persistent sinuses
- It should be comfortable to the patient
- Should leave reasonably good scar

5. Incisional Hernia:- defined as protrusion of omentum or organ through surgical incision. However if the muscles and aponeurotic layers of the abdomen doesn't heal properly an incisional hernia can result, infection, bowel obstruction and obesity are predisposing factors to incisional hernia

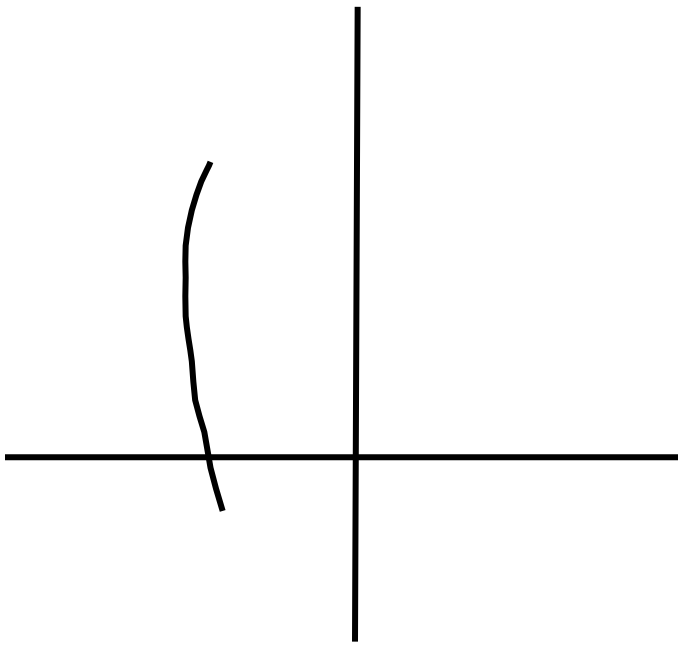
Structure of the Anterior Abdominal Wall:

1. Skin
2. Fascia:superficial Fatty Layer(camper) and deep Membranous layer (scarpa)
3. Muscles
4. Extraperitoneal fascia
5. Parietal peritoneum

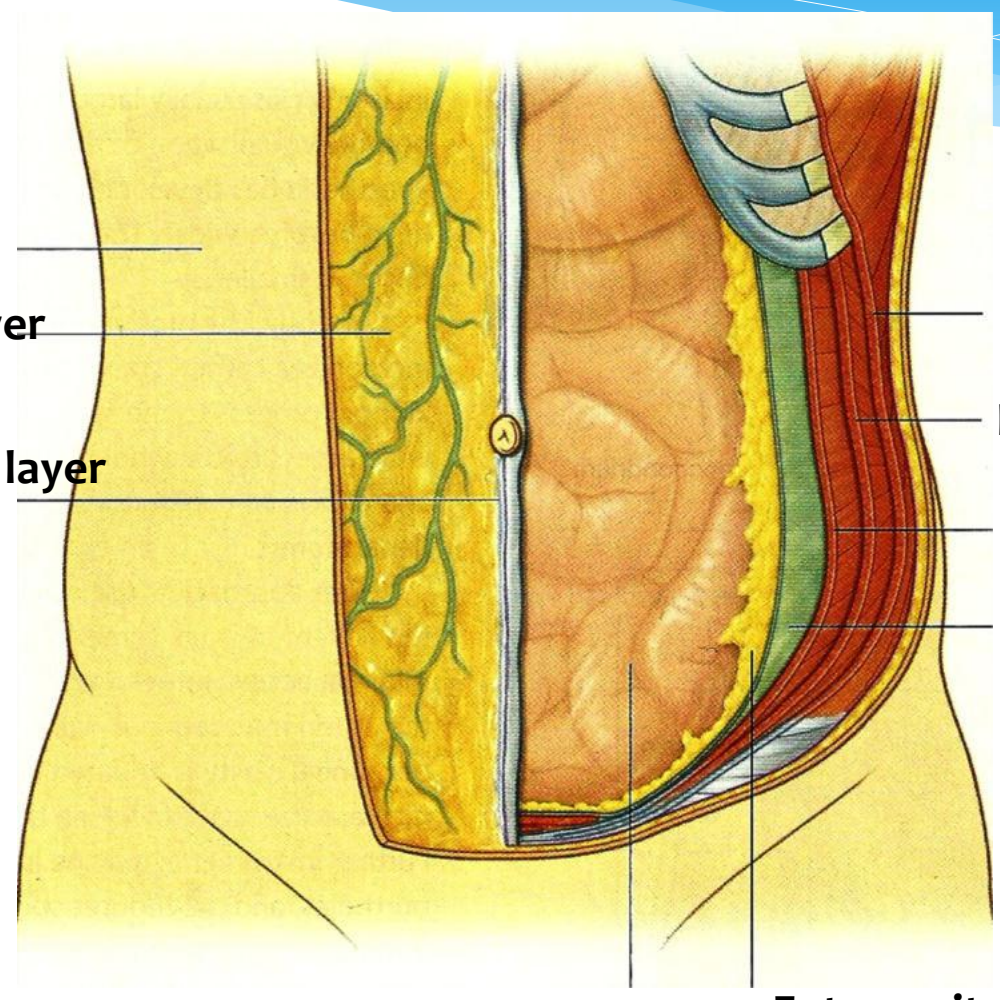


Longitudinal section

Transpyloric plane
Hilum of the kidneys
Pylorus of the stomach
Body of pancreas
Fundus of the gall bladder



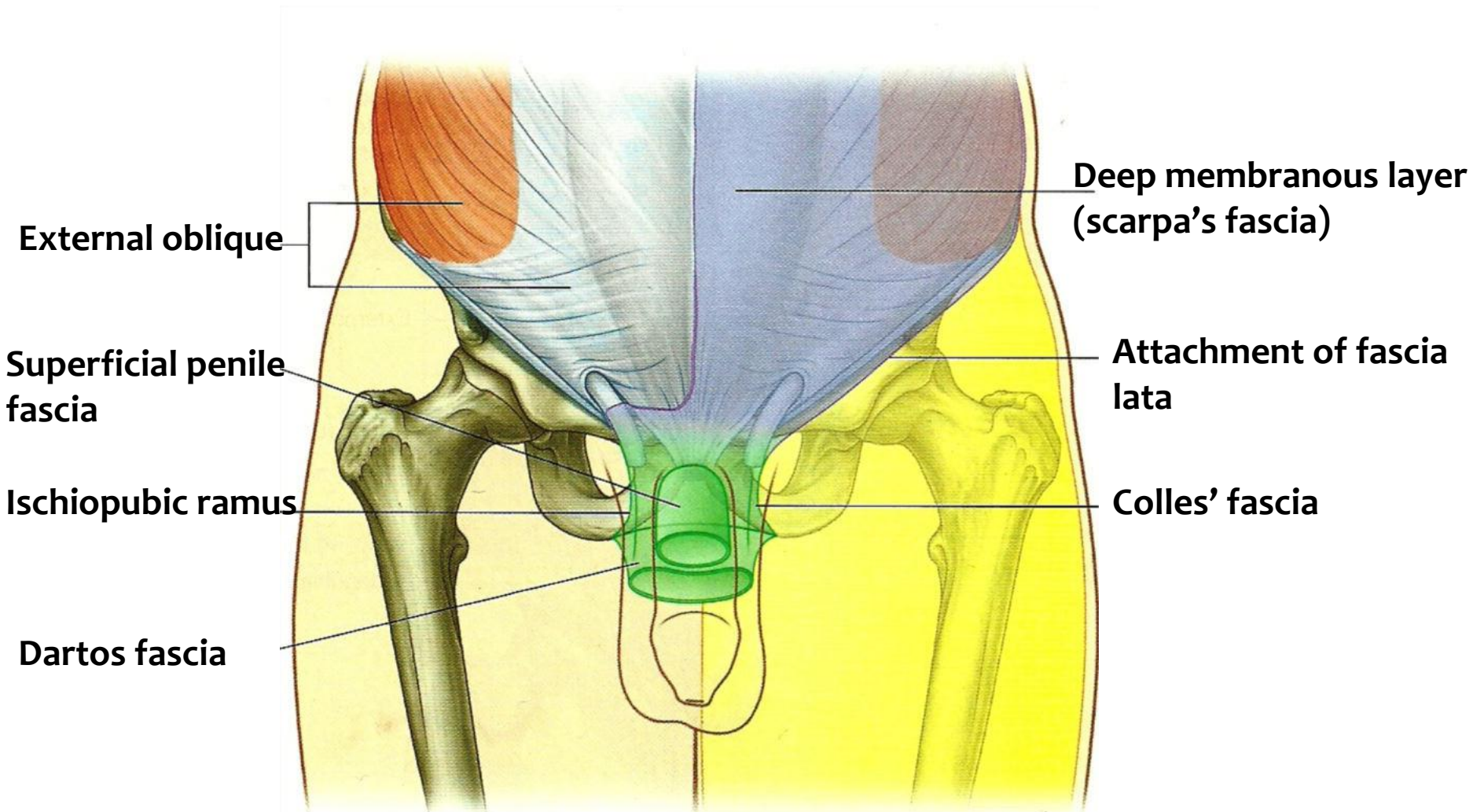
LAYERS OF ANTEROLATERAL ABDOMINAL WALL

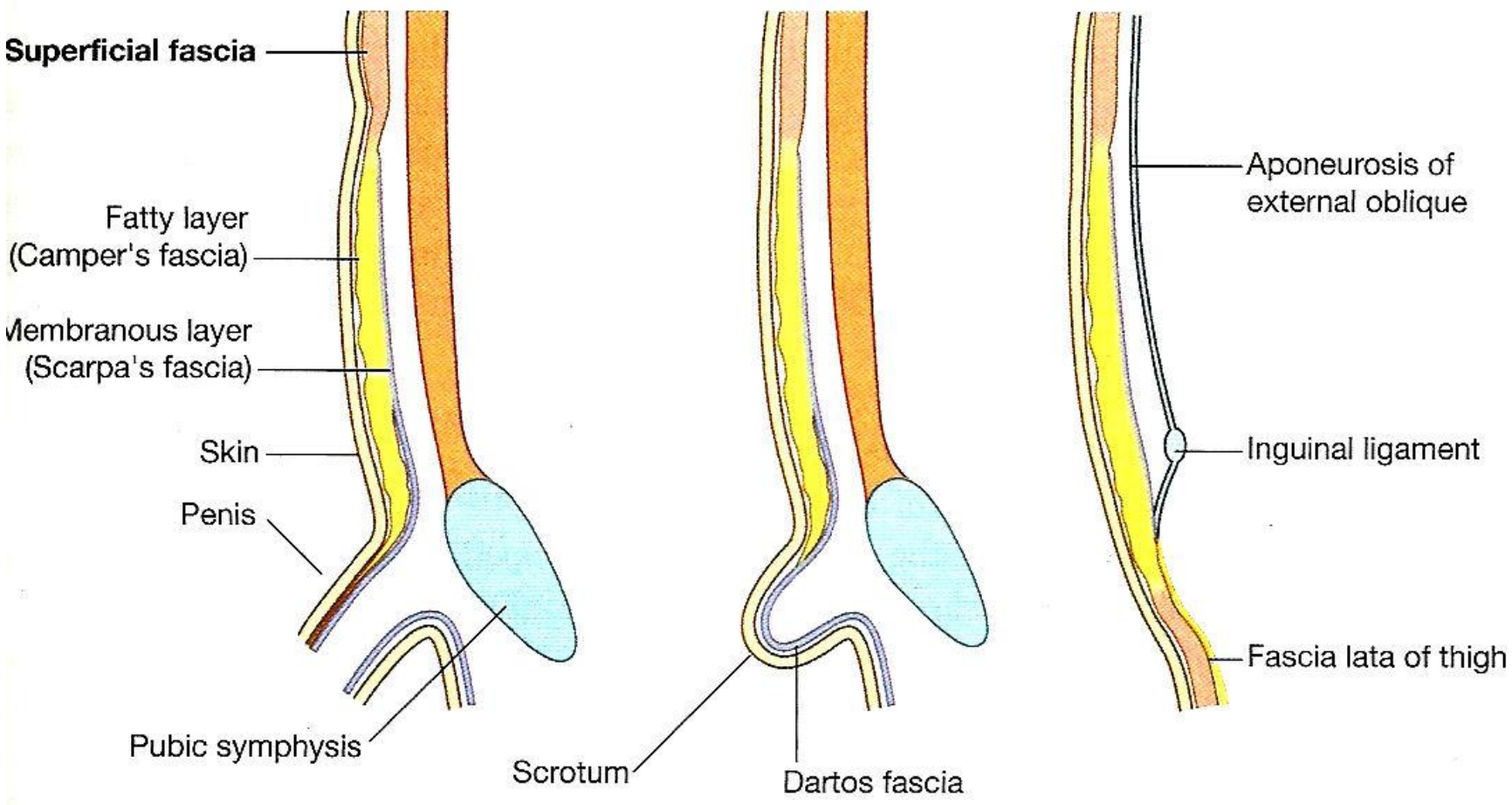


Superficial fascia

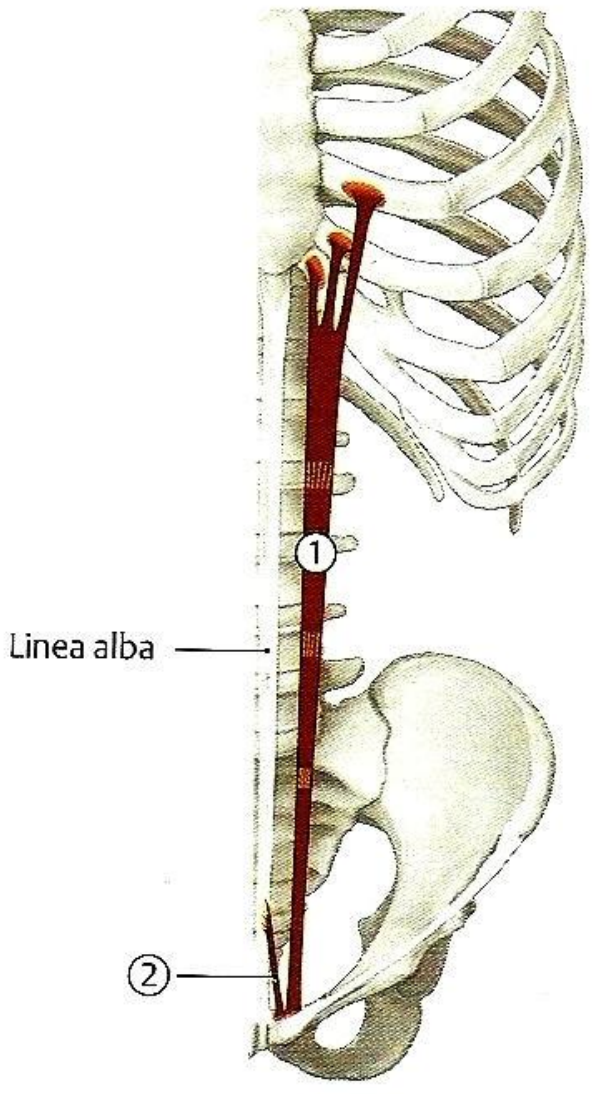
Superficial fatty layer (camper's fascia)

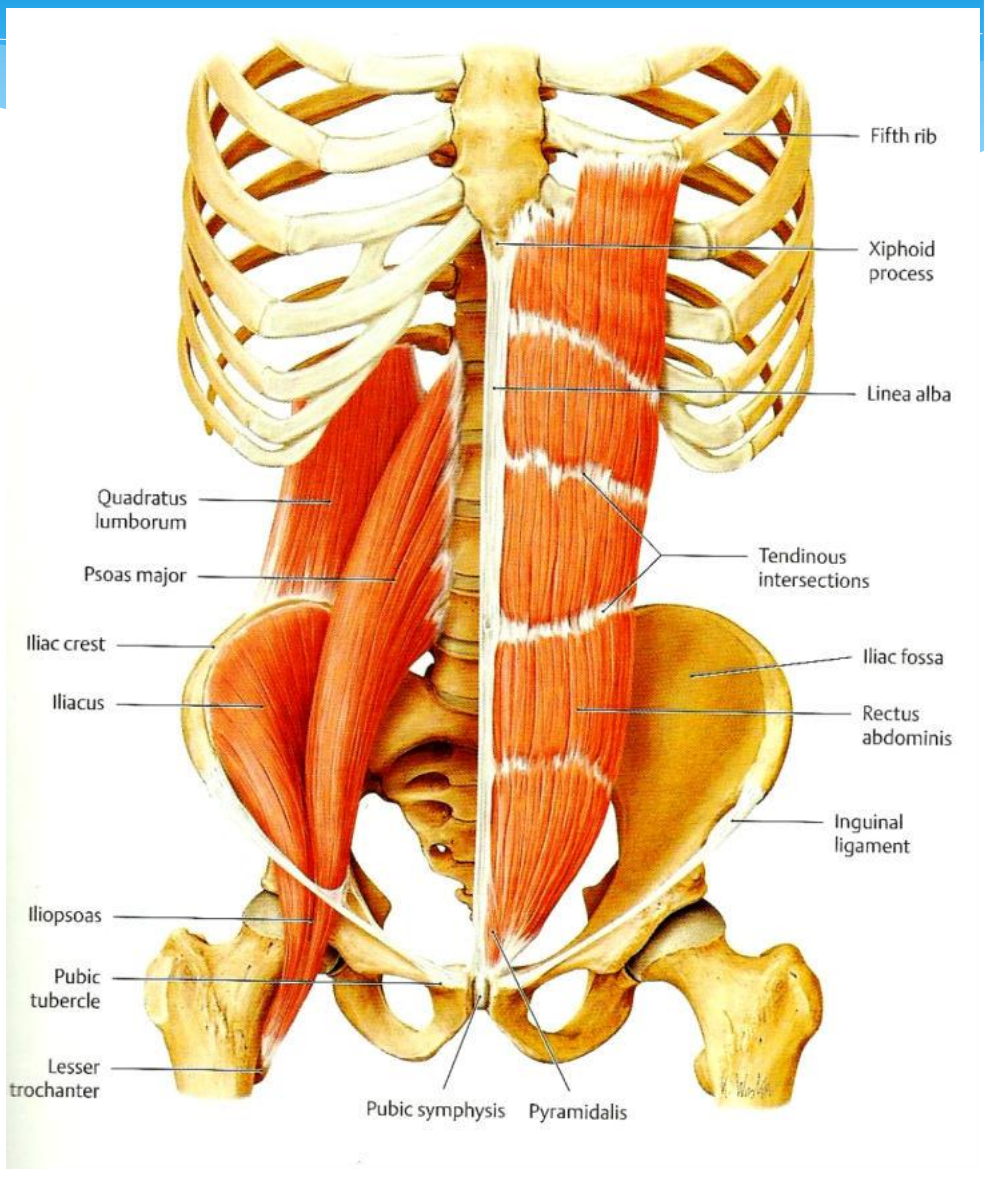
Deep membranous layer (scarpa's fascia)





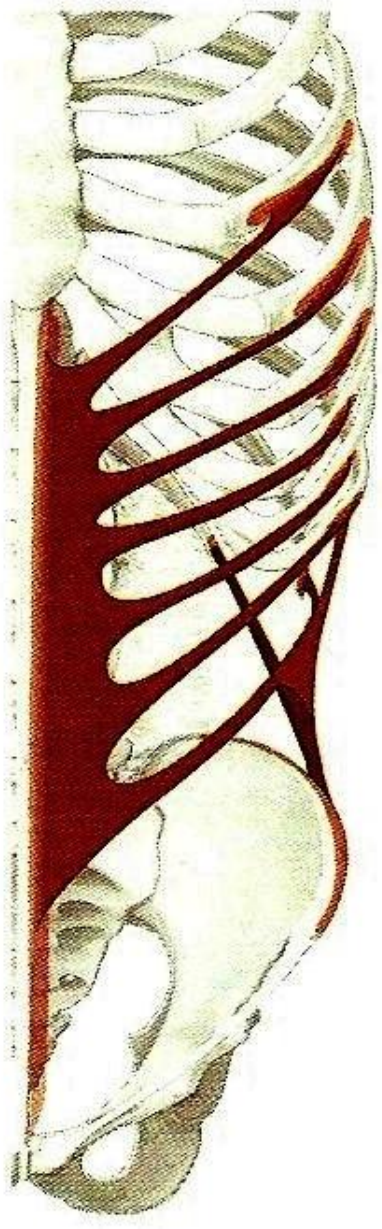
Muscles

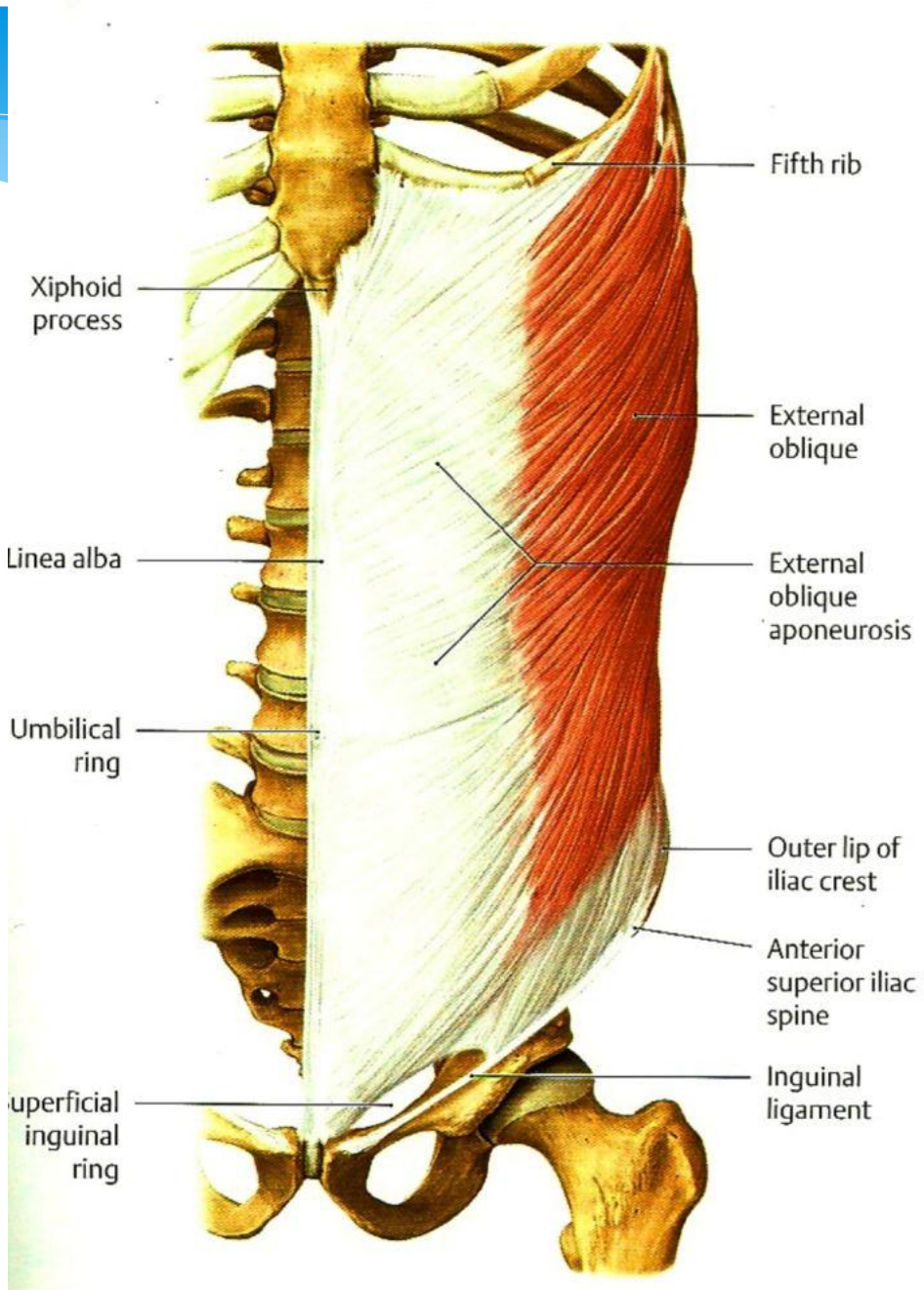




External oblique

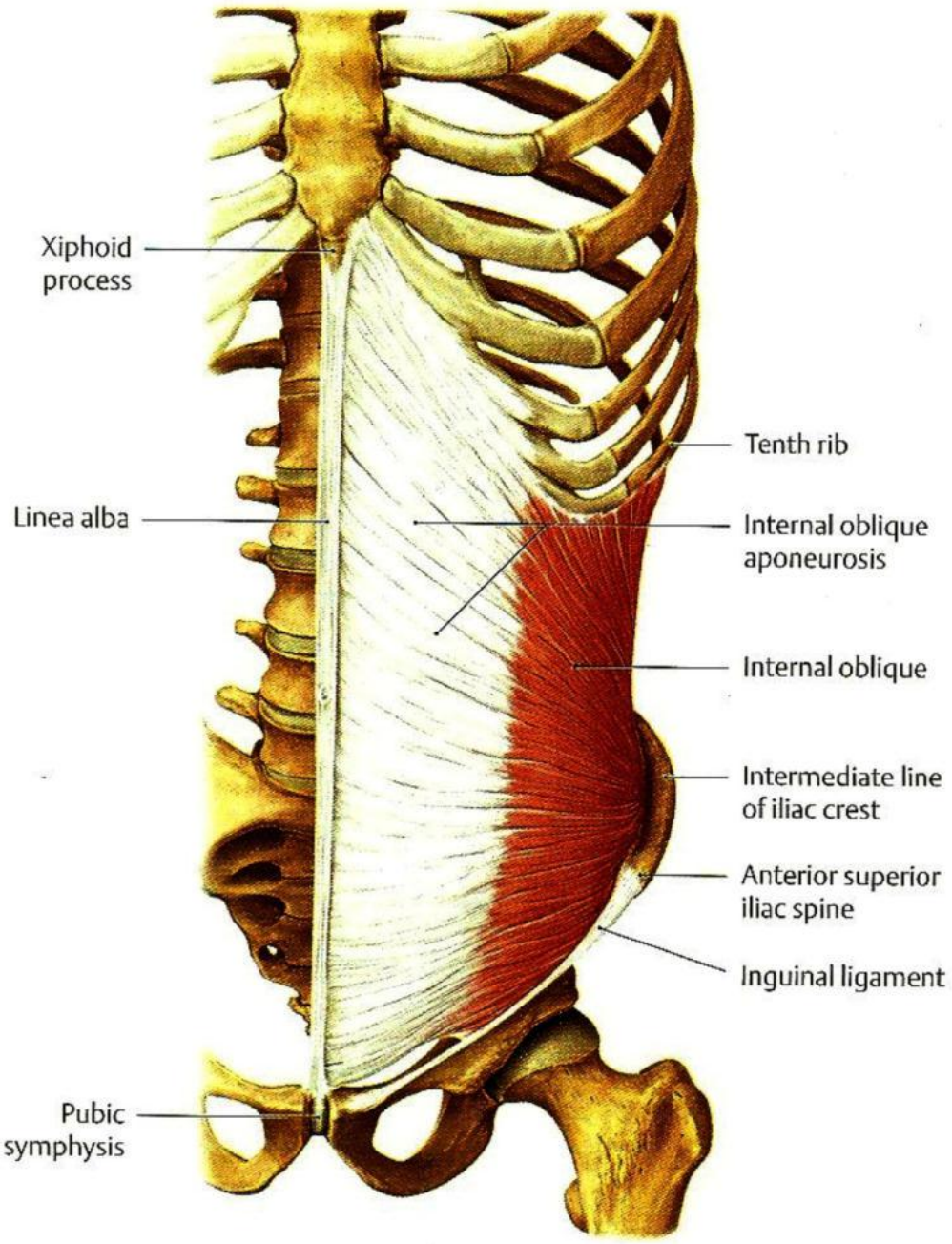
Origin	Insertion	Innervation	Function
Muscular slips from the outer surfaces of the lower eight ribs (ribs 5-12)	Ant. 2/3 outer lip of iliac crest; aponeurosis ending in midline raphe (linea alba)	Anterior rami of lower six thoracic spinal nerves (T7 to T12)	Compress abdominal contents; both muscles flex trunk; each muscle bends trunk to same side, turning anterior part of abdomen to opposite side





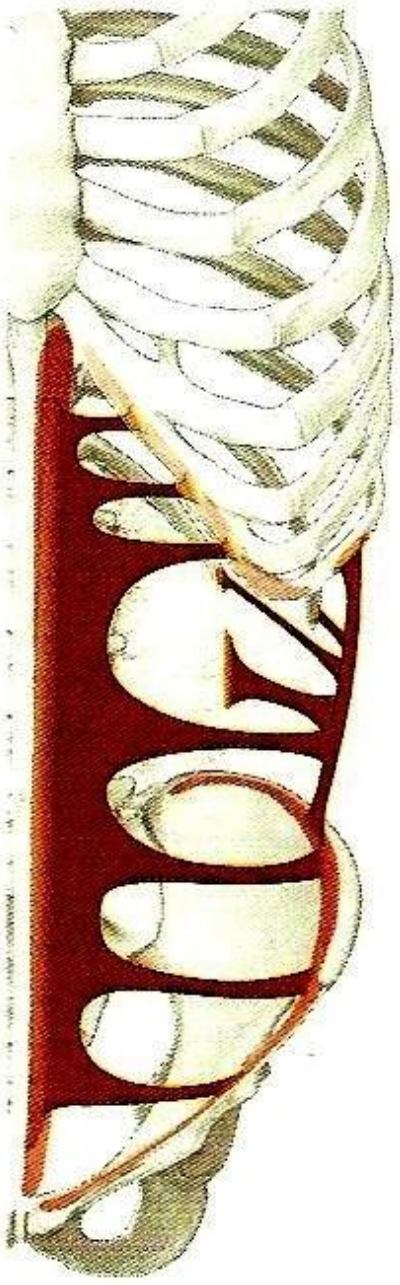
Internal oblique

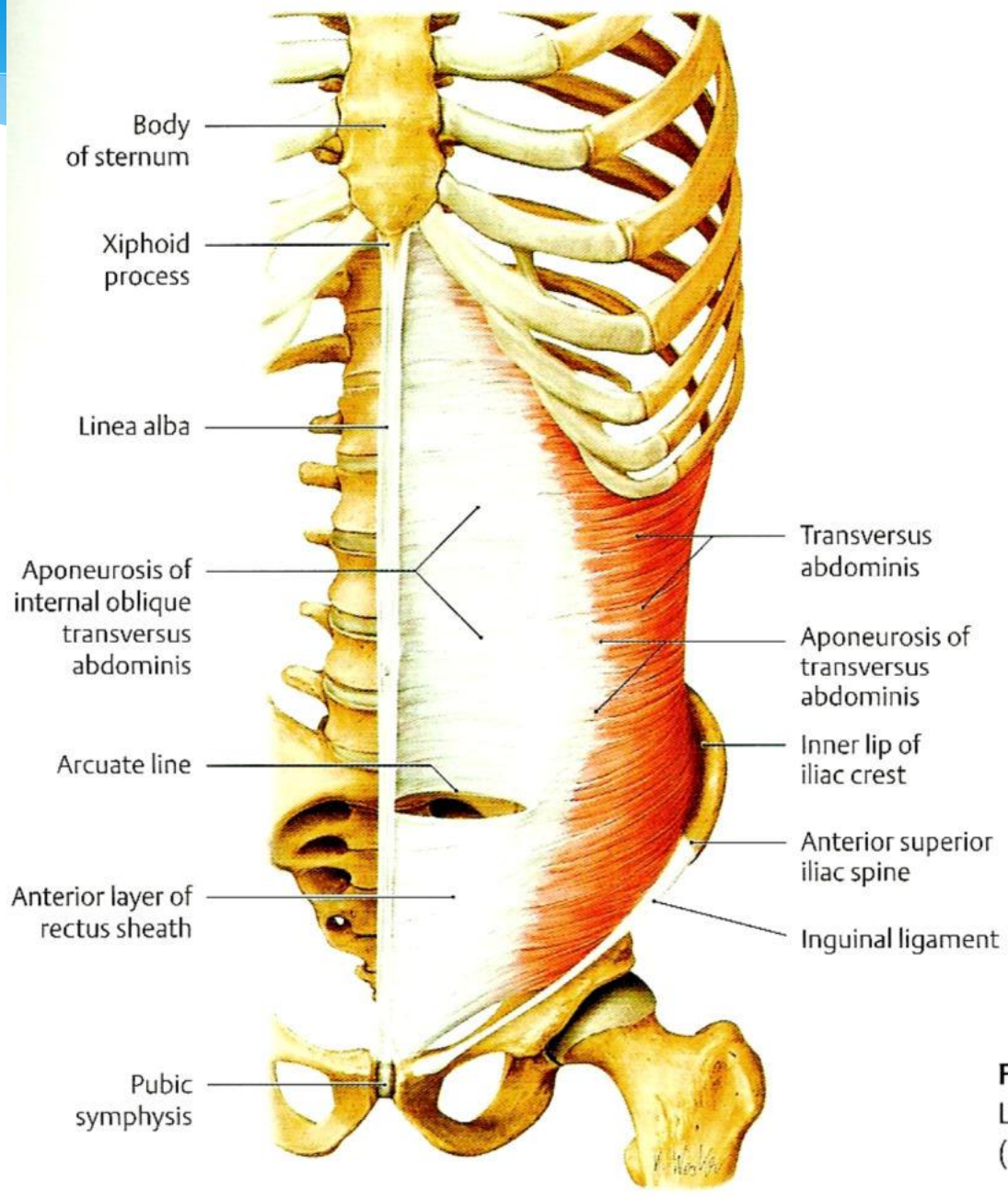
Origin	Insertion	Innervation	Function
Thoracolumbar fascia; iliac crest between origins of external and transversus; lateral two-thirds of inguinal ligament	Inferior border of the lower three or four ribs; aponeurosis ending in linea alba; pubic crest and pectineal line	Anterior rami of lower six thoracic spinal nerves (T7 to T12) and L1	See External Oblique



Transverse abdominis

Origin	Insertion	Innervation	Function
Thoracolumbar fascia; medial lip of iliac crest; lateral one-third of inguinal ligament; costal cartilages lower six ribs (ribs 7-12)	Aponeurosis ending in linea alba; pubic crest and pectineal line	Anterior rami of lower six thoracic spinal nerves (T7 to T12) and L1	Compress abdominal contents





Rectus abdominis

Origin	Insertion	Innervation	Function
Pubic crest, pubic tubercle, and pubic symphysis	Costal cartilages of ribs 5-7; xiphoid process	Anterior rami of lower seven thoracic spinal nerves (T7 to T12)	Compress abdominal contents; flex vertebral column; tense abdominal wall

PYRAMIDALIS :

Pyramidalis is a triangular muscle that lies in front of the lower part of rectus abdominis within the rectus sheath.

O- Ant surface of pubis I- Linea Alba

Innervation: Terminal branches of the subcostal nerve, which is the ventral ramus of the twelfth thoracic spinal nerve.

Actions: Pyramidalis contributes to tensing the lower linea alba, but is of doubtful physiological significance.

Cremaster muscle:

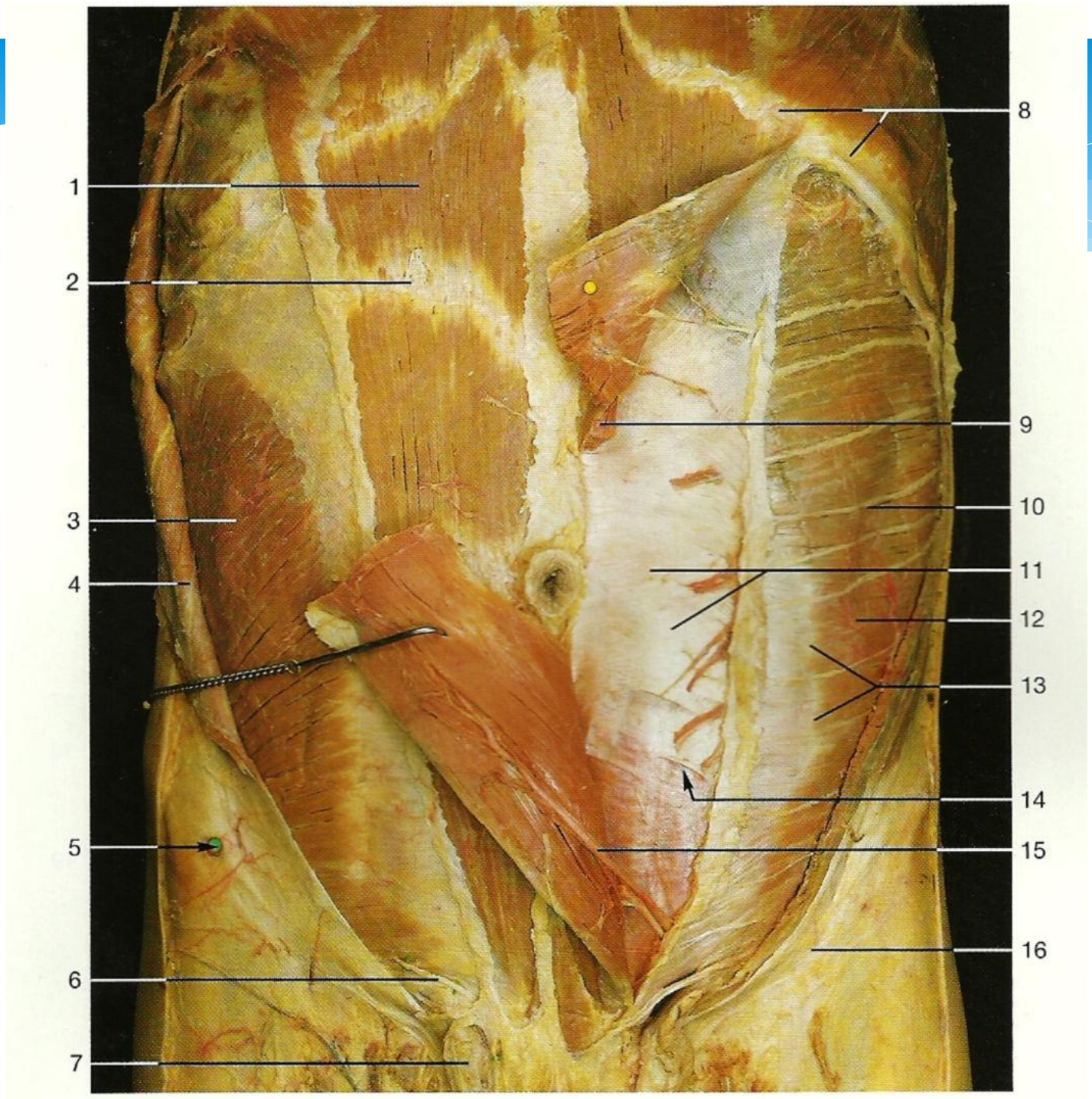
Loosely arranged muscle fasciculi lying along spermatic cord. May form incomplete coating around cord- cremasteric fascia.

Arises mainly from the inferomedial border of internal oblique / transversus abdominis.

Medial portion –pubic tubercle & lateral pubic crest.

Innervation: Genital branch of the genitofemoral nerve, L1 & L2

Actions: Cremaster pulls the testis up towards the superficial inguinal ring.

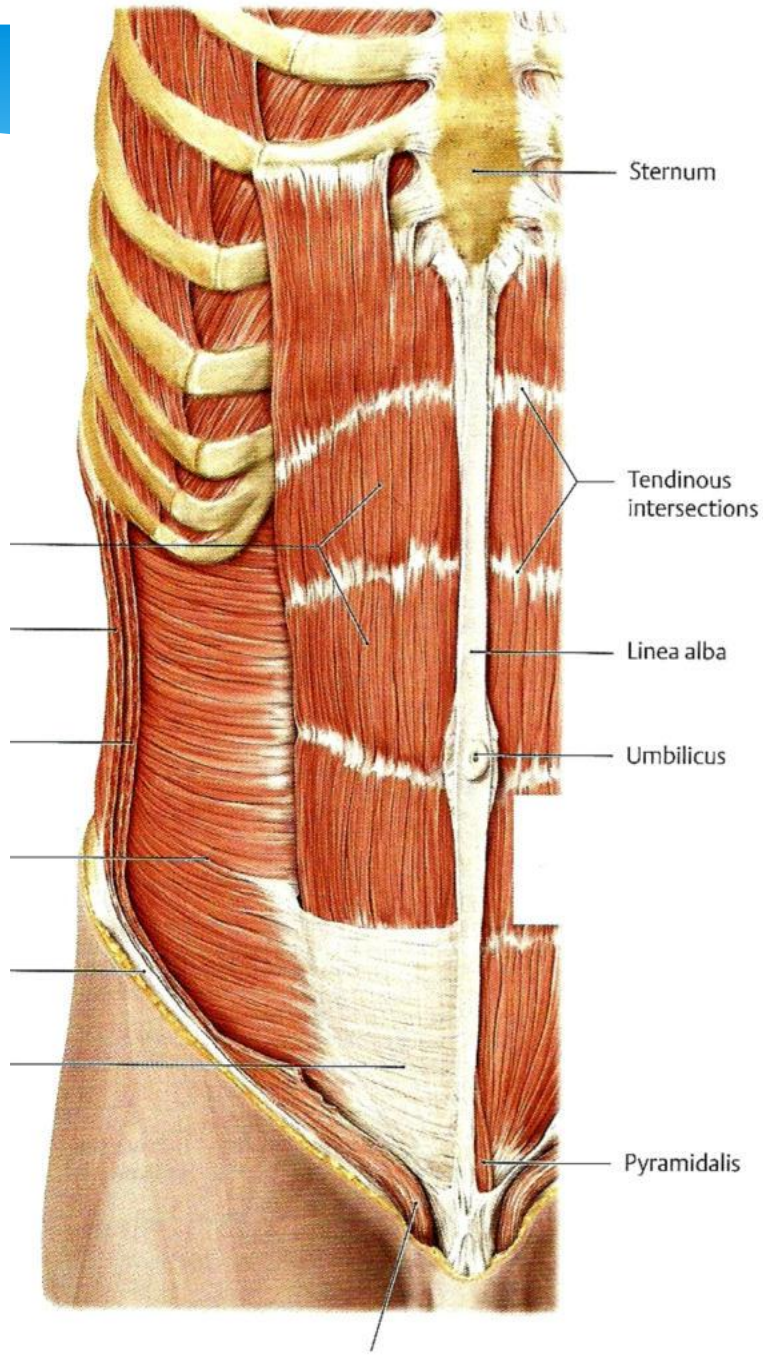


CONJOINT TENDON

The conjoint tendon is formed from the lower fibres of internal oblique and the lower part of the aponeurosis of transversus abdominis.

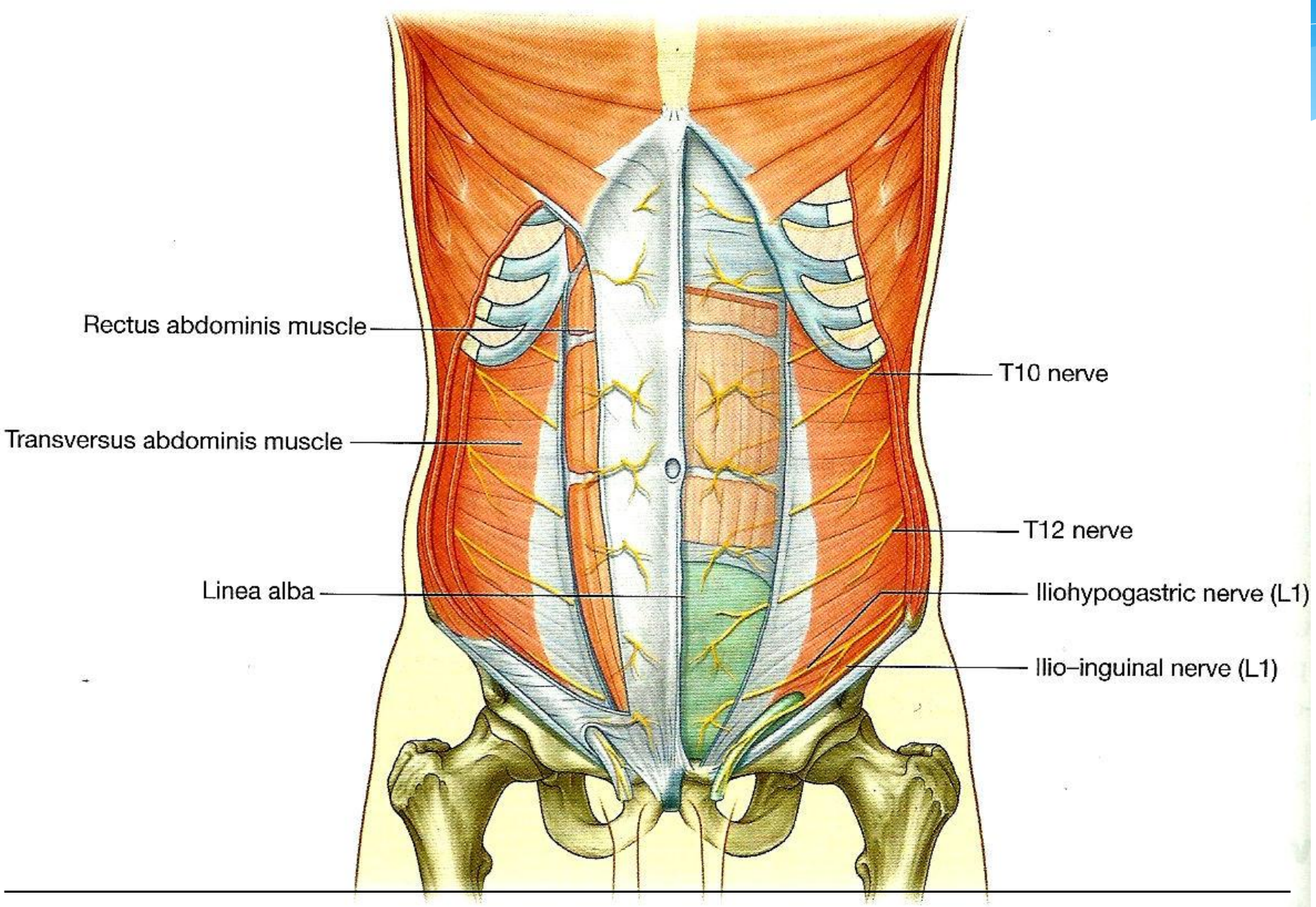
It is attached to the pubic crest and pectineal line.

It descends behind the superficial inguinal ring and acts to strengthen the medial portion of the posterior wall of the inguinal canal.



Spermatic cord, External oblique –

Cutaneous nerves



Deep nerves of the ant. Abd. Wall: Lower six thoracic nerves

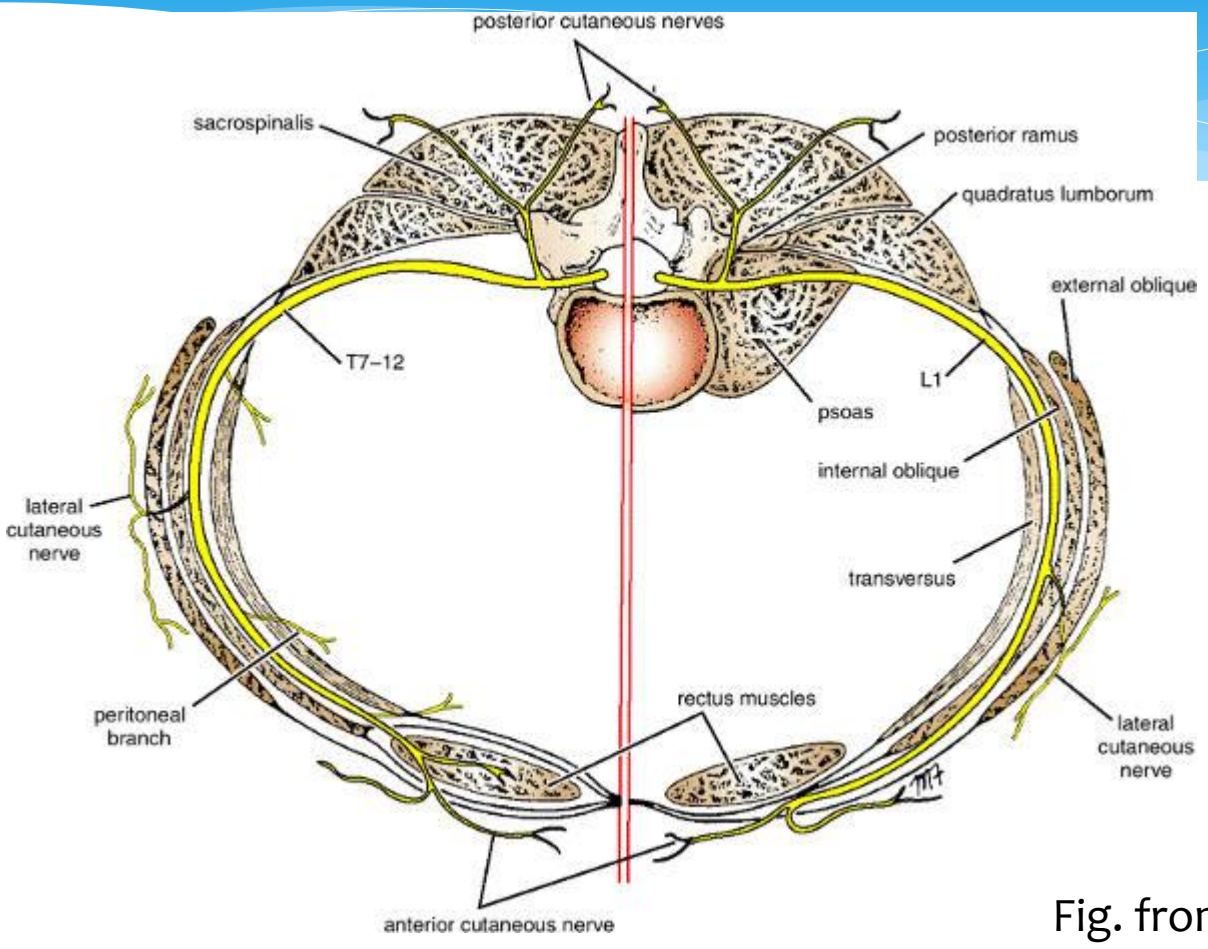
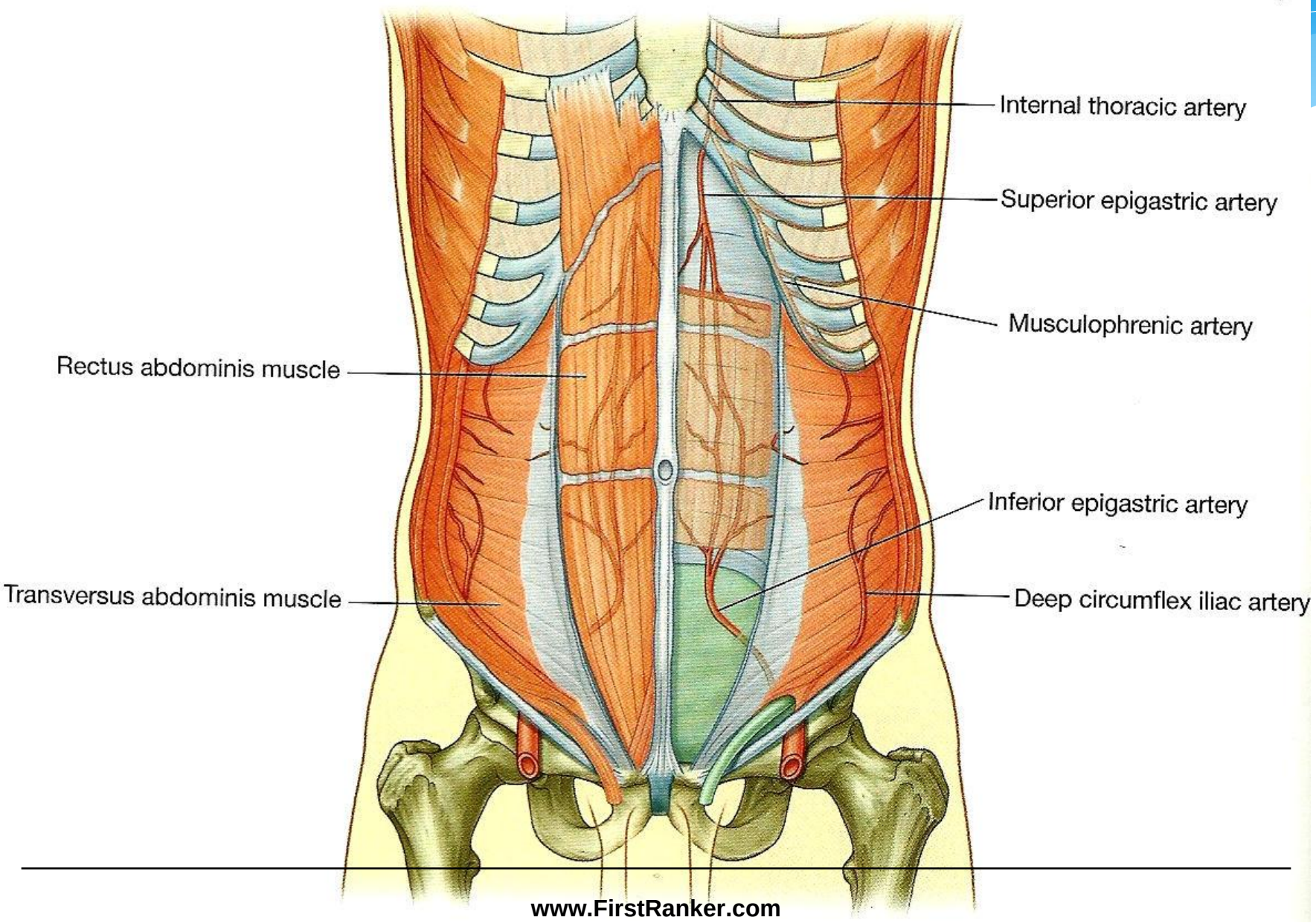


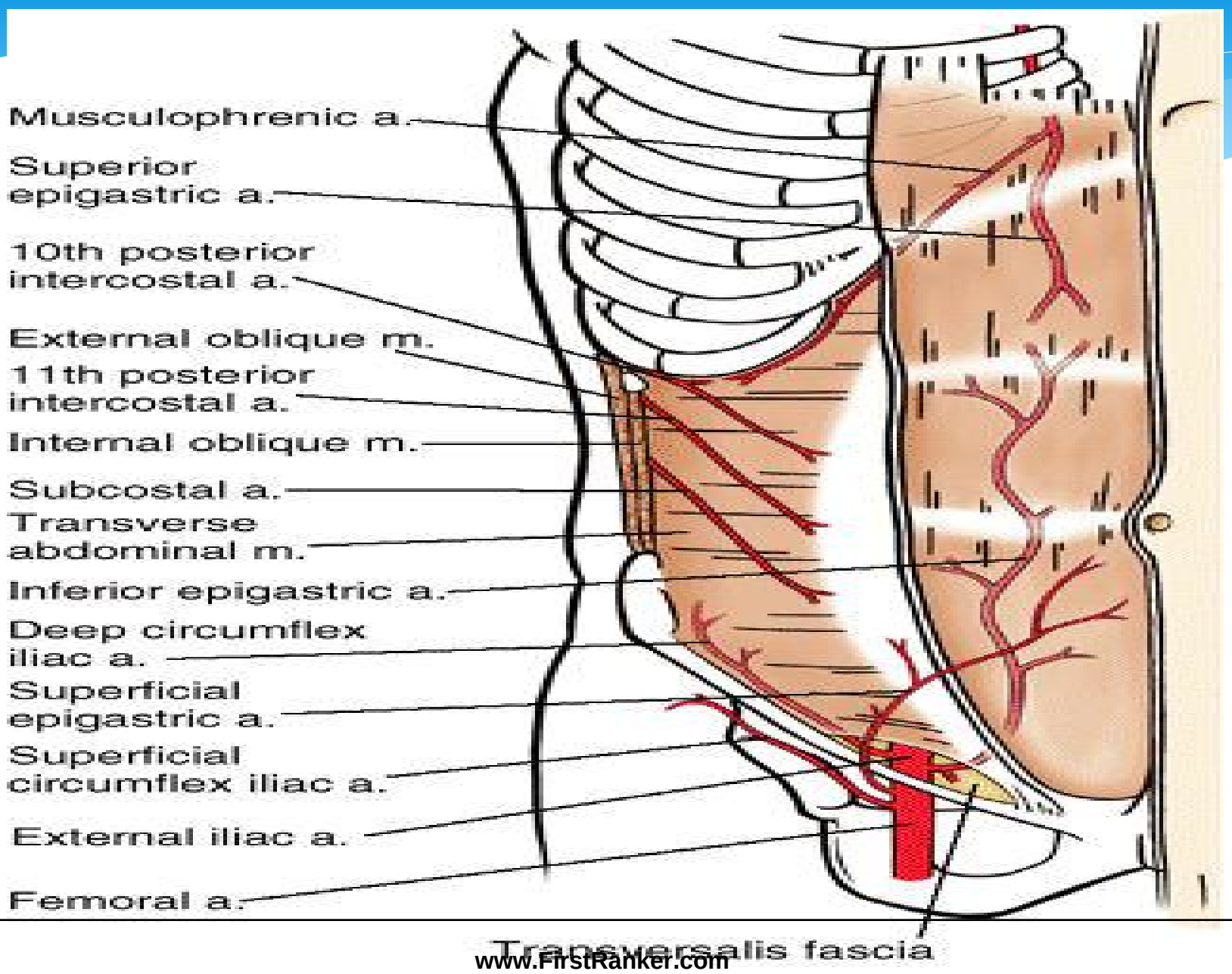
Fig. from Snells'

Cutaneous vessels



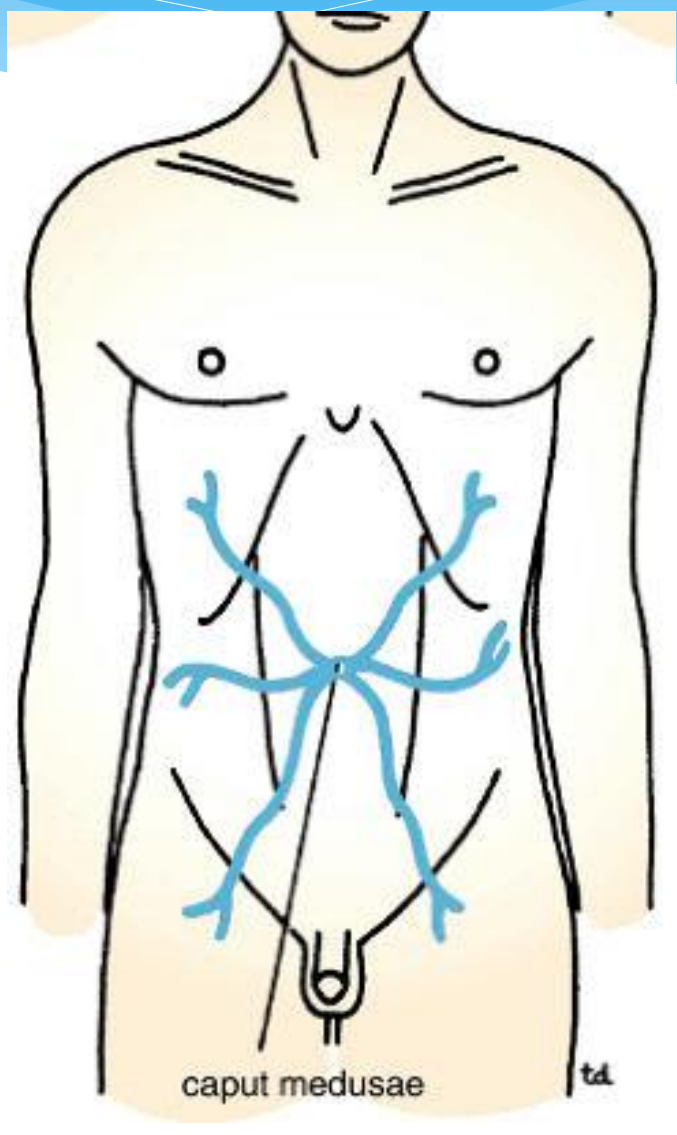
The primary blood vessels (arteries and veins) of the anterolateral abdominal wall :

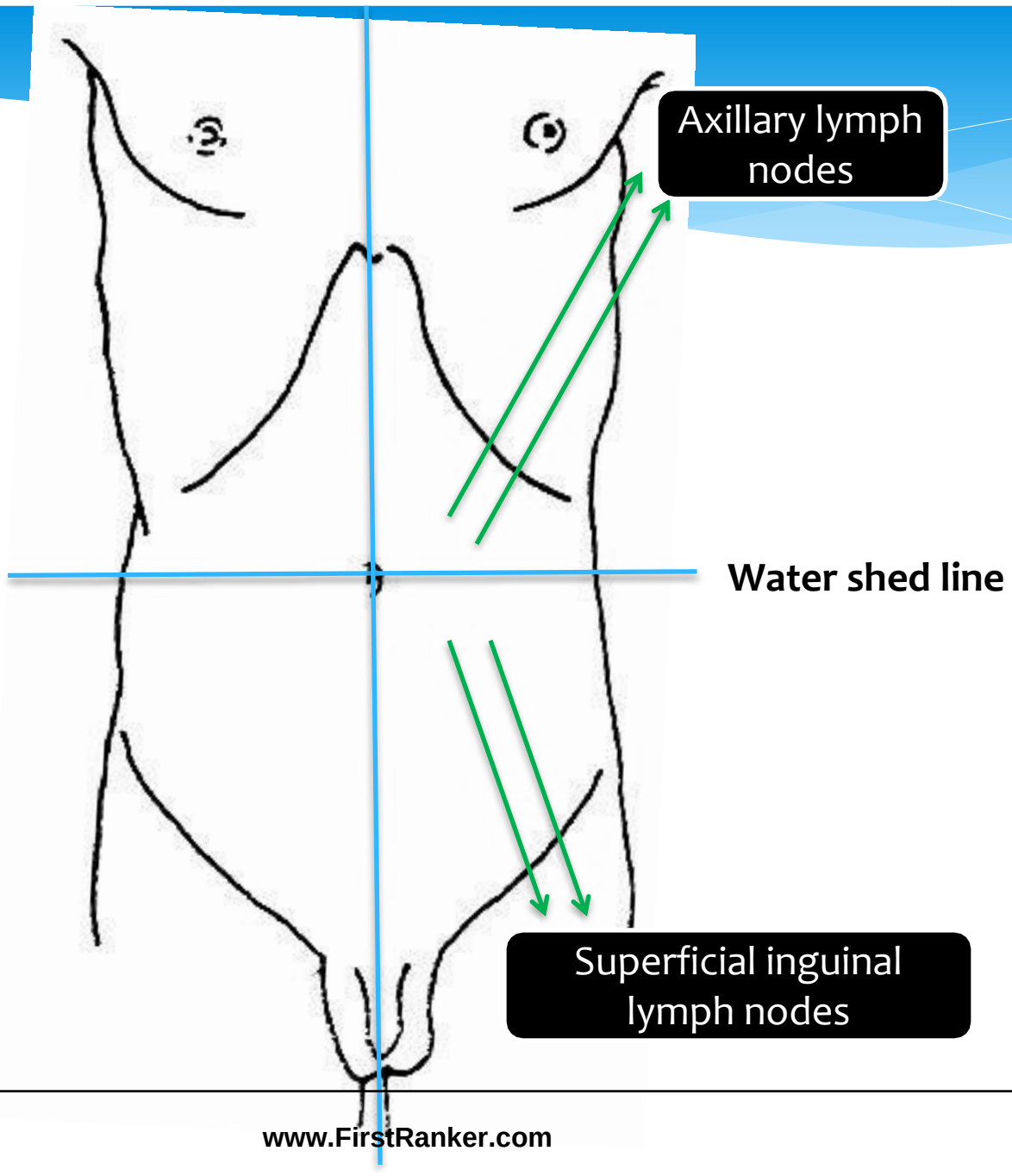
- **Superior epigastric vessels** and branches of the musculophrenic vessels from the internal thoracic vessels.
- **Inferior epigastric and deep circumflex iliac** vessels from the external iliac vessels.
- **Superficial circumflex iliac and superficial epigastric vessels** from the femoral artery and greater saphenous vein, respectively.
- **Posterior intercostal vessels of the 11th intercostal space and the anterior branches of subcostal vessels**

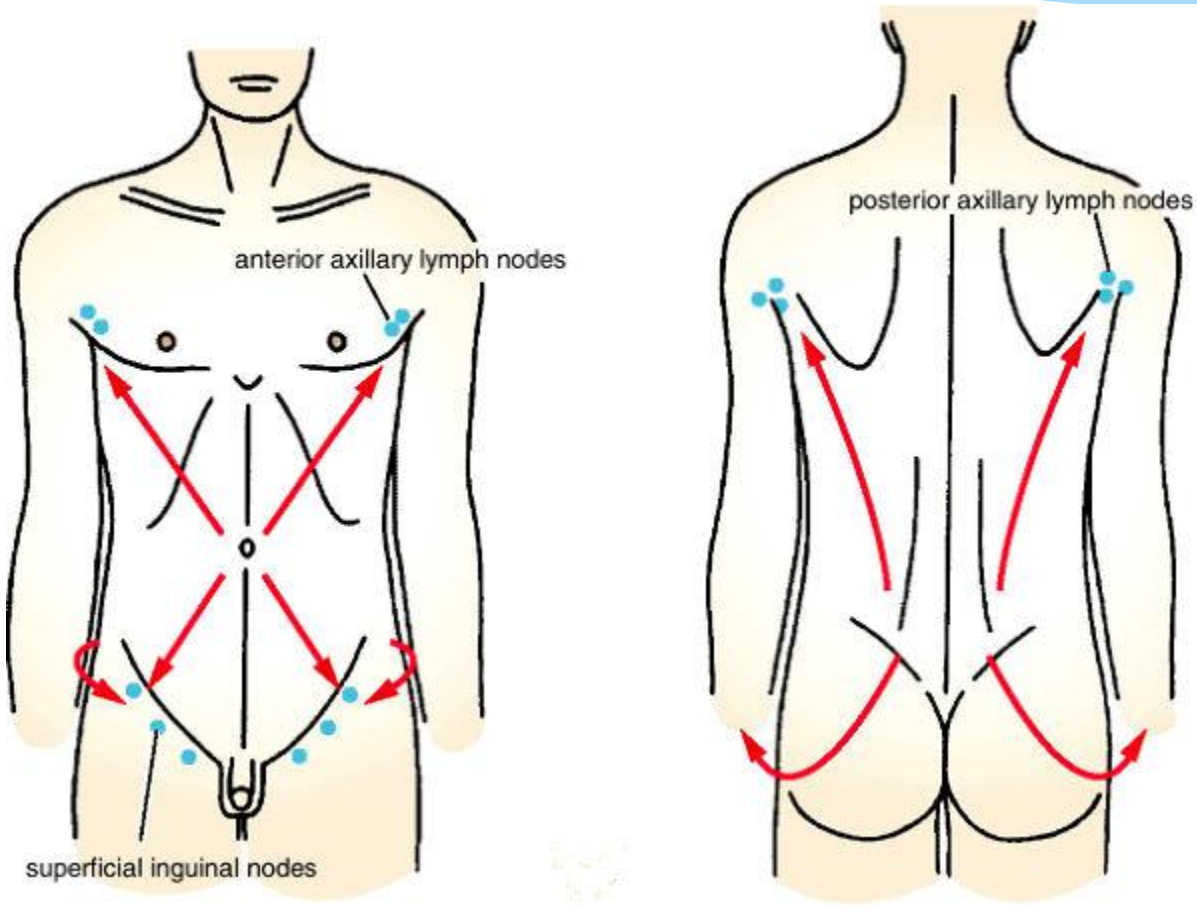


Veins

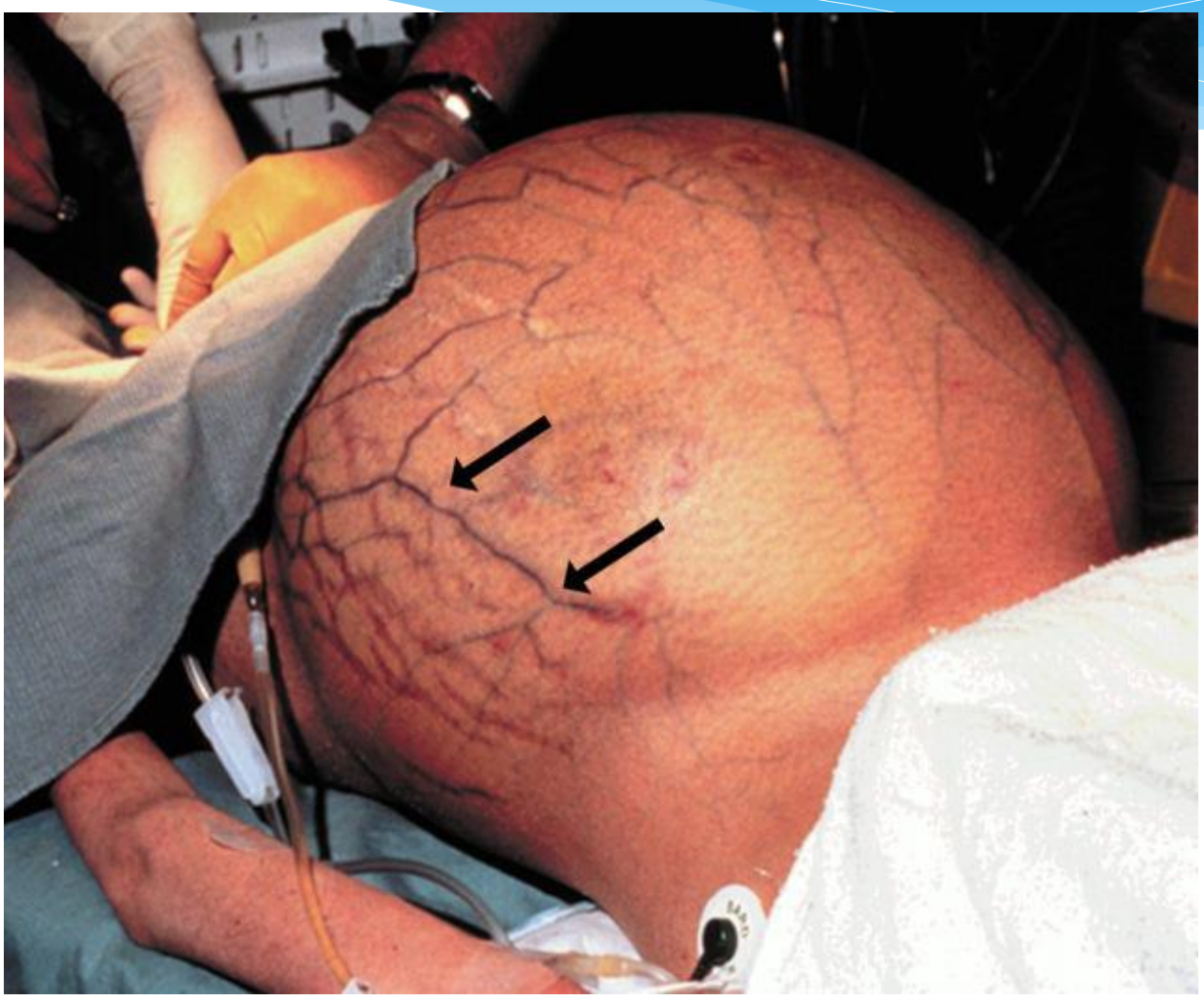
The venous drainage passes above mainly into the axillary vein via the lateral thoracic vein and below into the femoral vein via the superficial epigastric & the great saphenous veins.





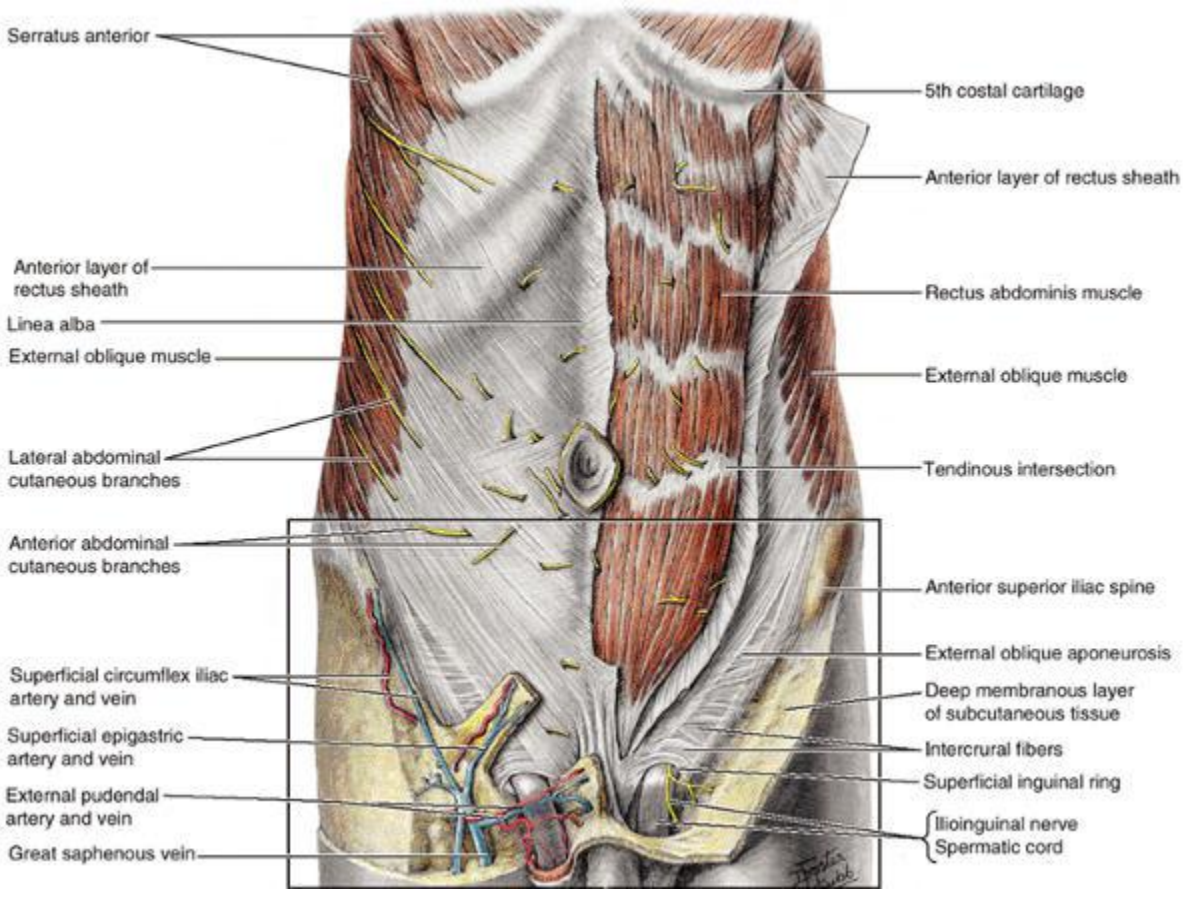


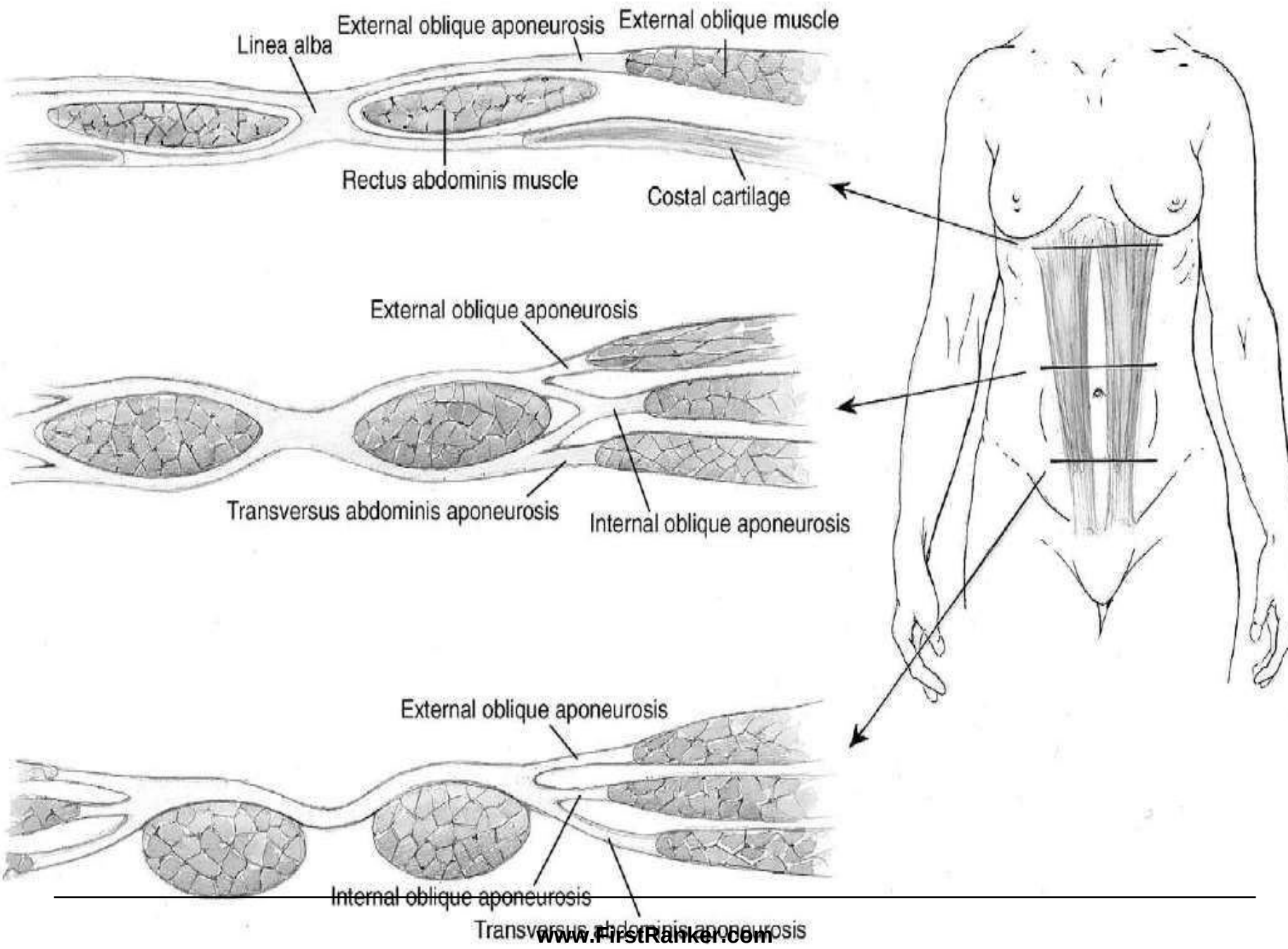
Photograph shows a CAPUT MEDUSAE accentuated by a large amount of ascites in a patient being prepared for liver transplantation

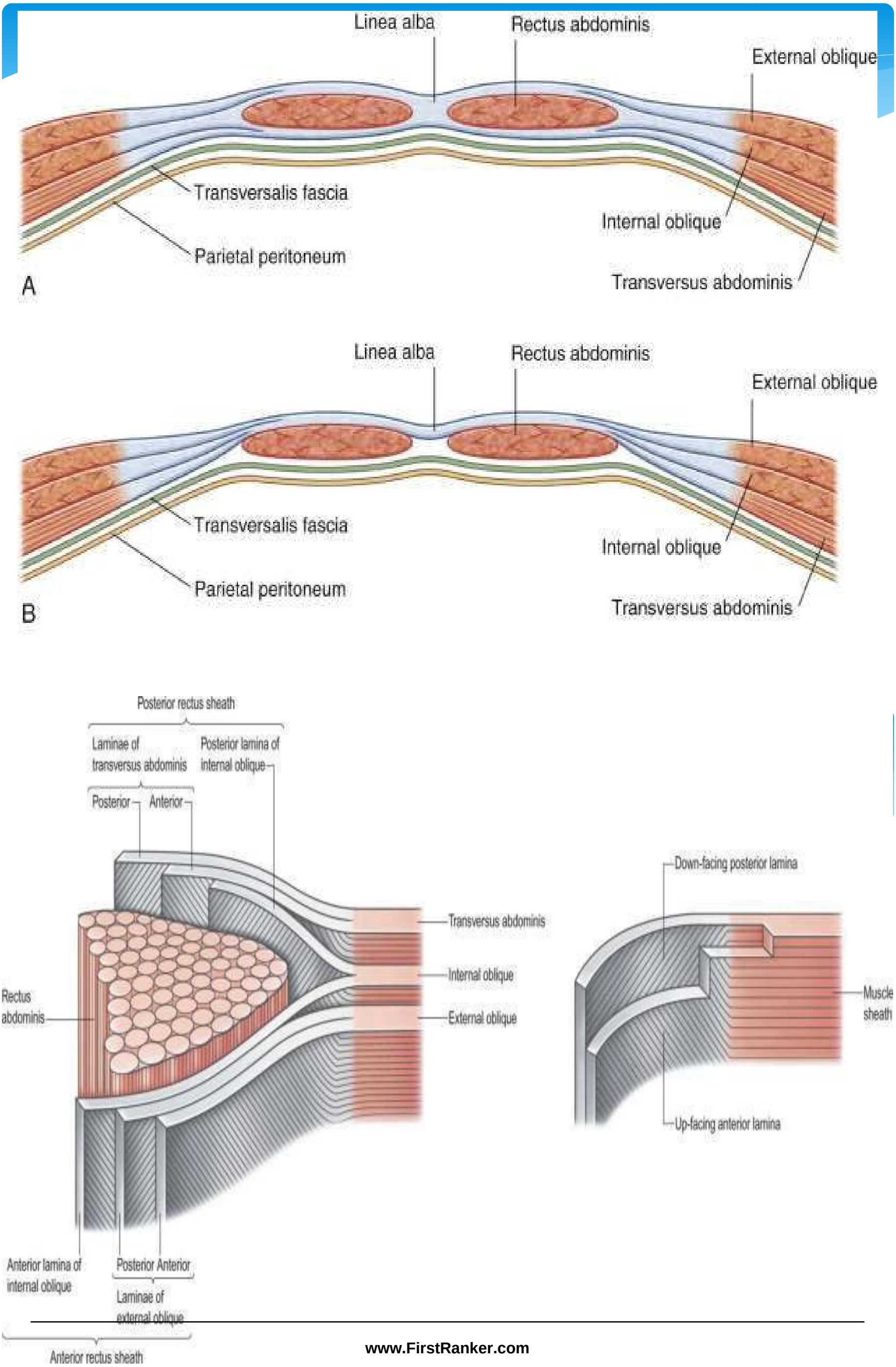


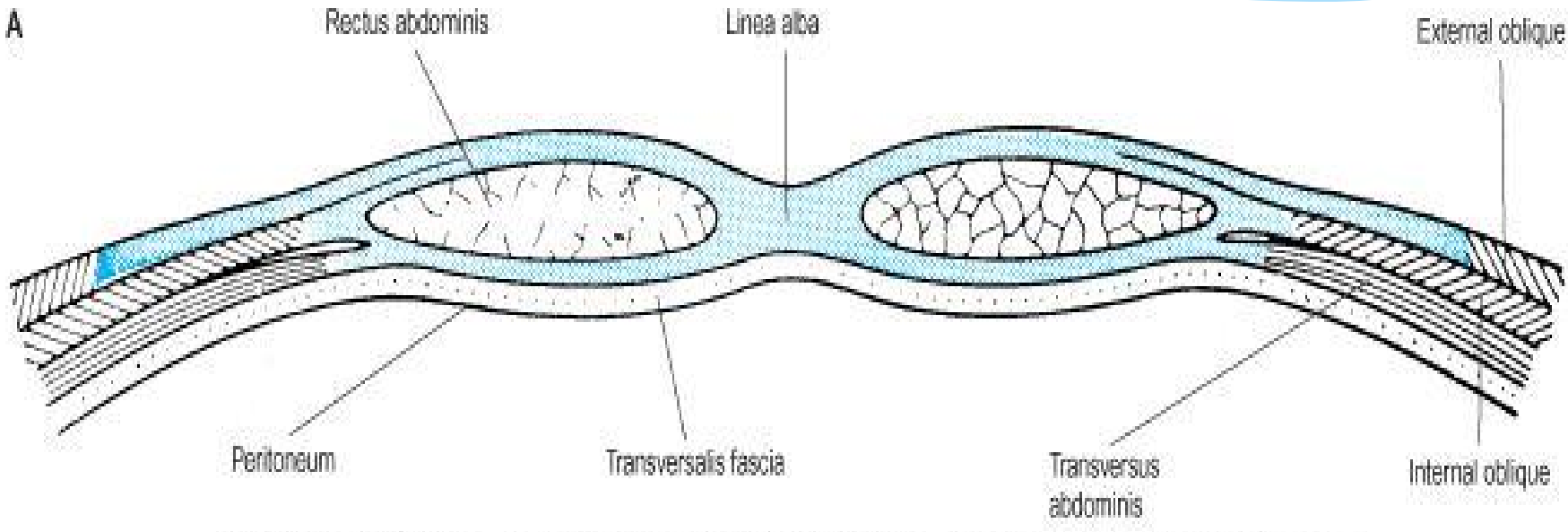
Henseler K P et al. Radiographics 2001;21:691-704

RECTUS SHEATH





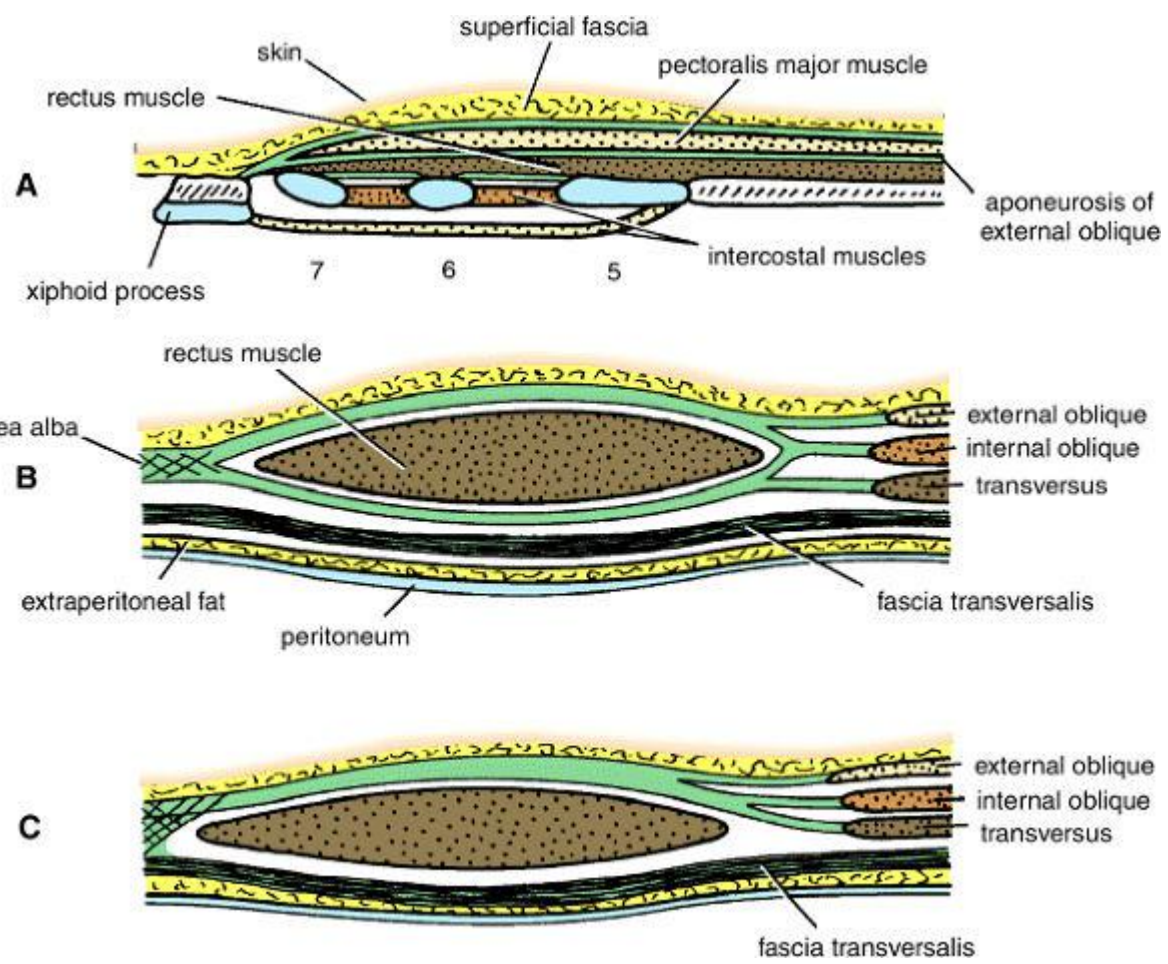




© Elsevier Ltd 2005. Standring: Gray's Anatomy 39e - www.graysanatomyonline.com

Transverse sections of the Rectus sheath seen at three levels. A. Above the costal margin. B. Between the costal margin and the level of the anterior superior iliac spine. C. Below the level of the anterior superior iliac spine and above the pubis. (Snells')

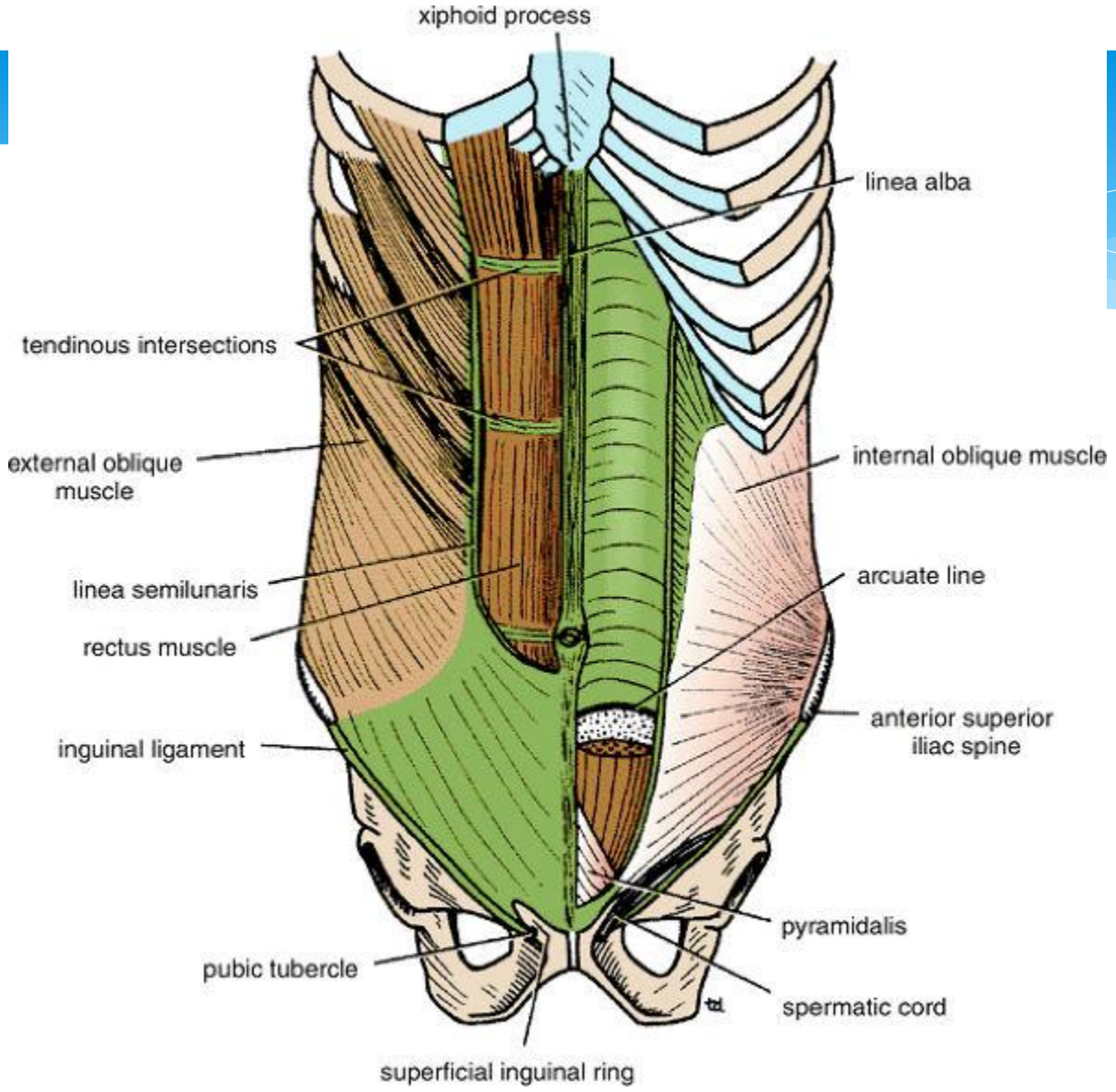
ANT.



MED

LAT

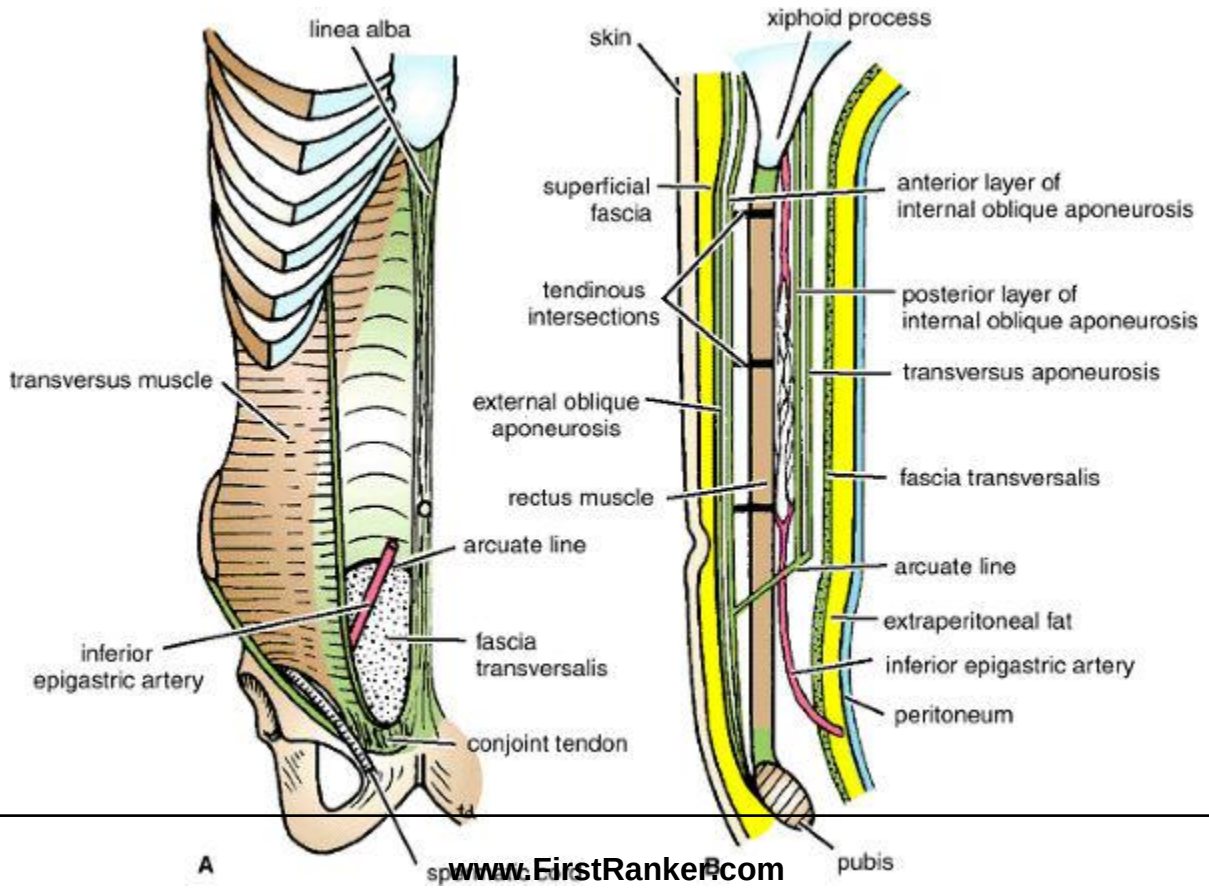
POST.



Left: The anterior wall of the sheath has been partly removed, revealing the rectus muscle with its tendinous intersections. **Right:** The **posterior wall of the rectus sheath** is shown. The edge of the **arcuate line** is shown at the level of the anterior superior iliac spine.

Contents of Rectus sheath:

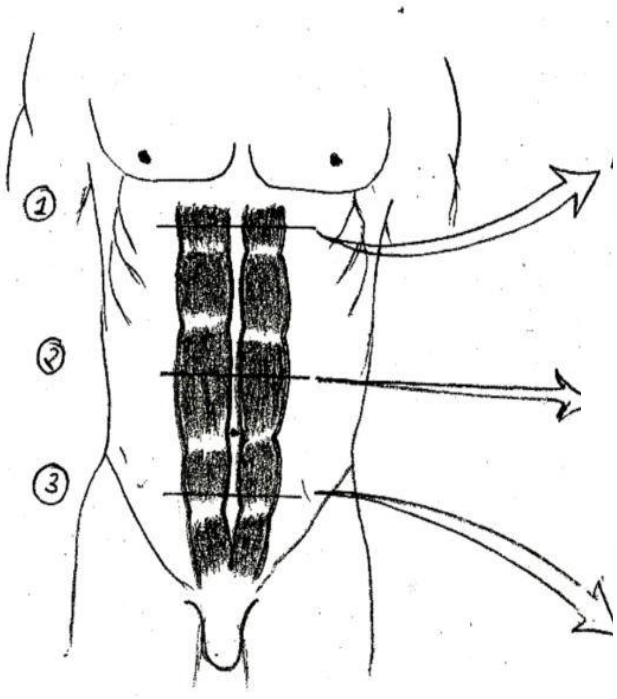
1.Muscles:Rectus abdominis & Pyramidalis 2. Arteries: Sup & Inf epigastric; 3. veins: Sup & Inf. Epigastric; 4. Nvs: Terminal brs of lower six thoracic nerves



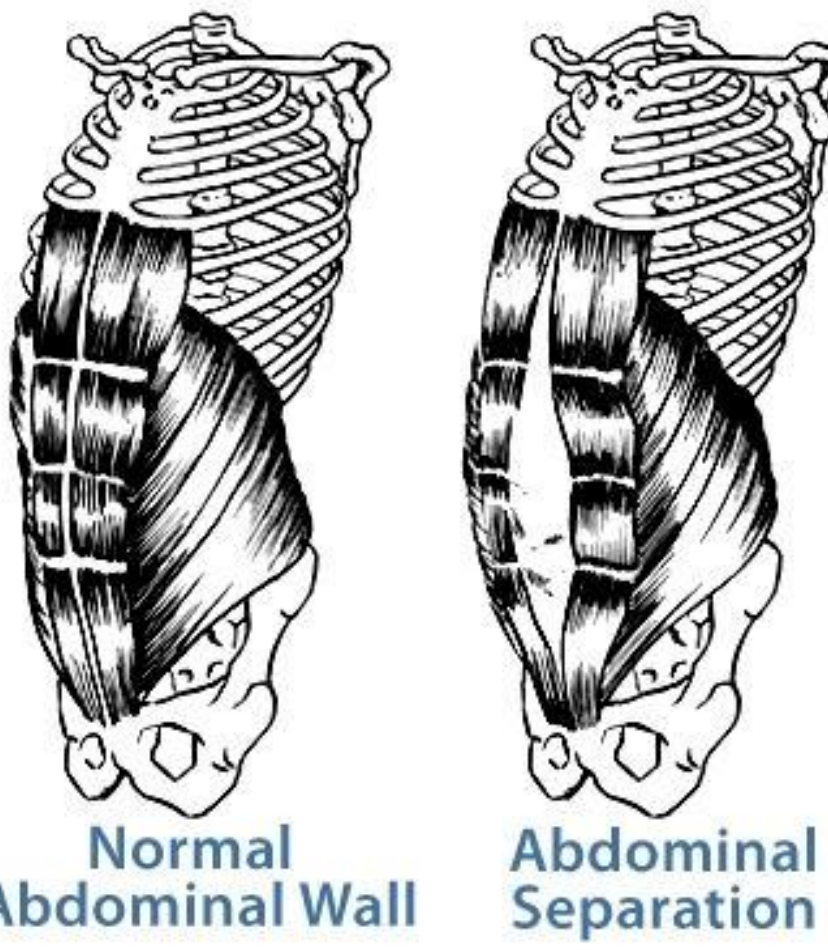
RECTUS SHEATH

Aponeurotic sheath covering rectus abdominis muscle.

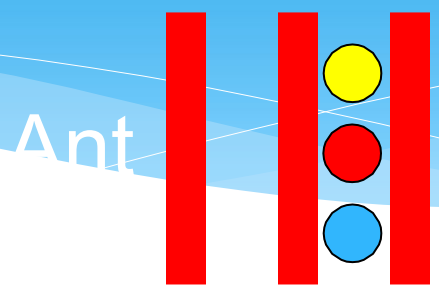
Features
Formation
Contents



Divarication of recti



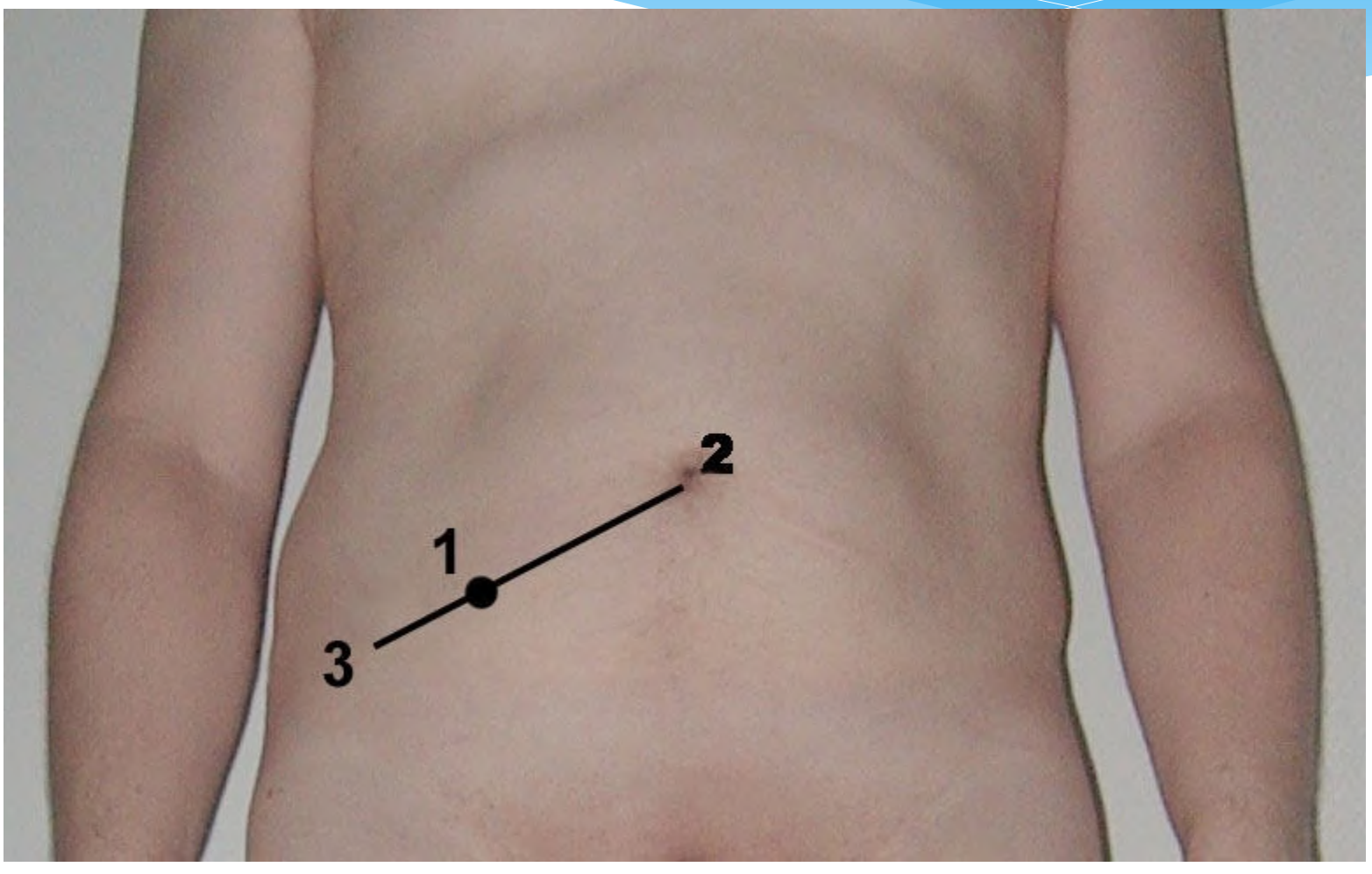
Neurovascular plane



Appendix

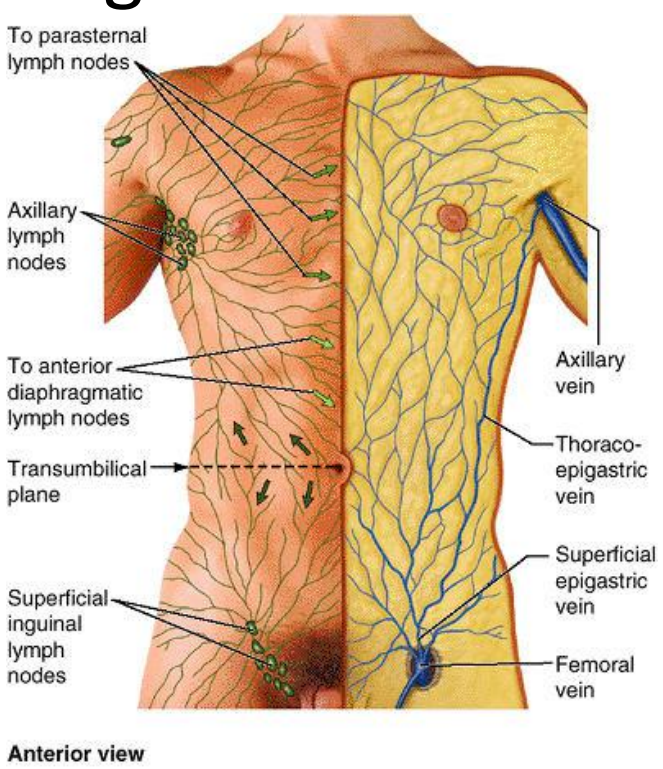
* Mc Burneys point

  junction between the medial two third and the lateral one third on the line joining the ASIS and umbilicus



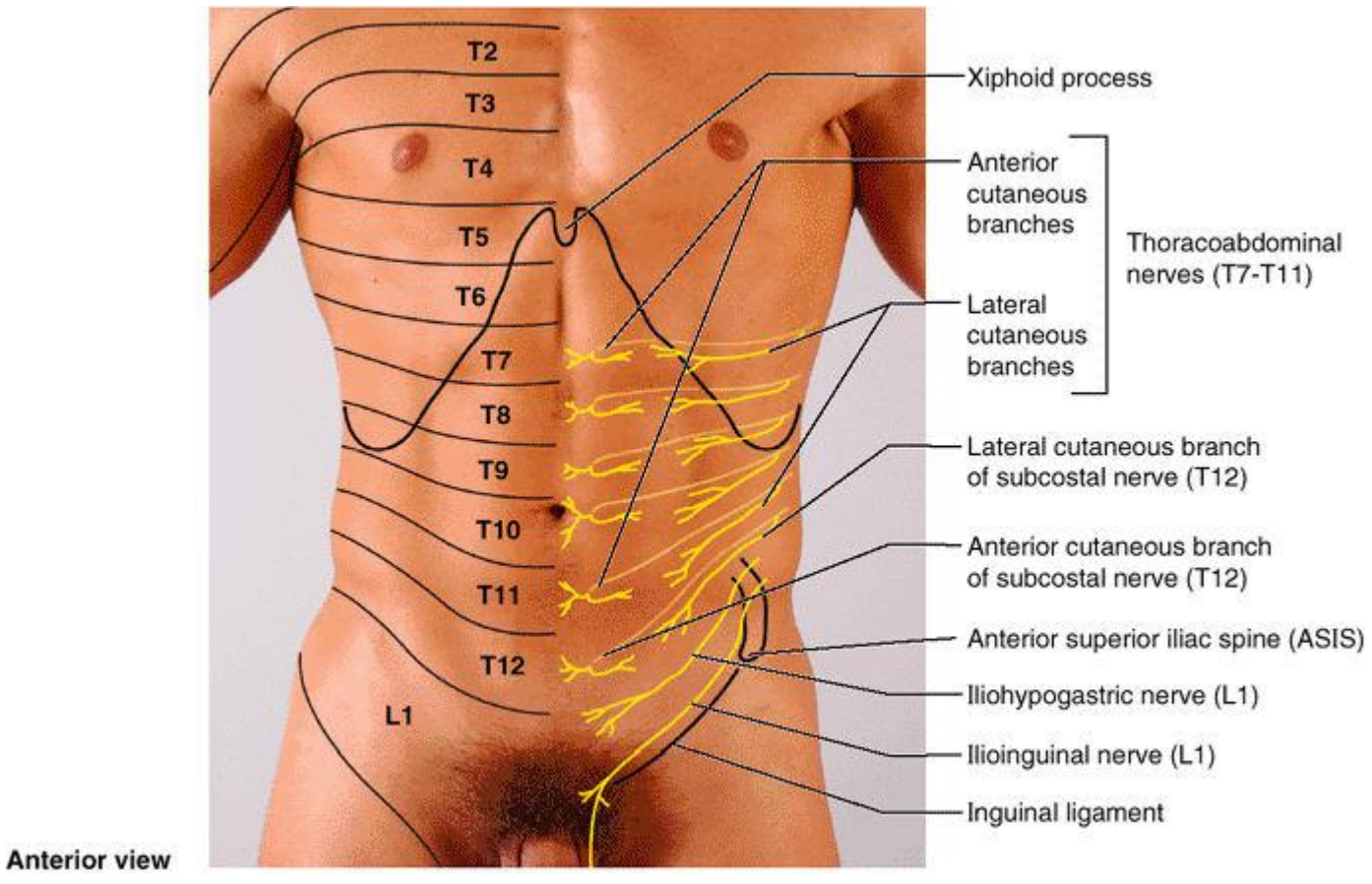
Umbilicus

- Site of attachment of umbilical cord
- Water-shed: in reference to Lymphatic and venous drainage



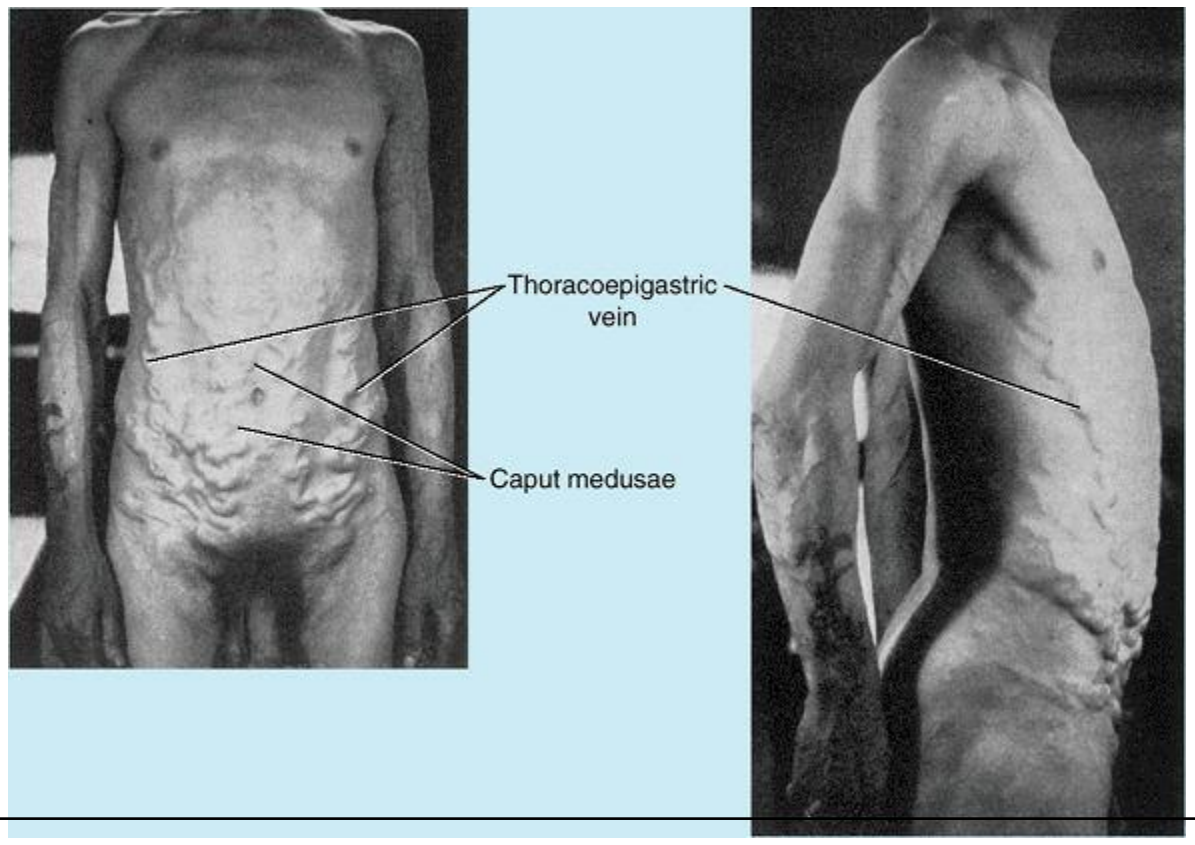
Umbilicus

- Skin around it supplied by T 10 segment Nerve.



Umbilicus

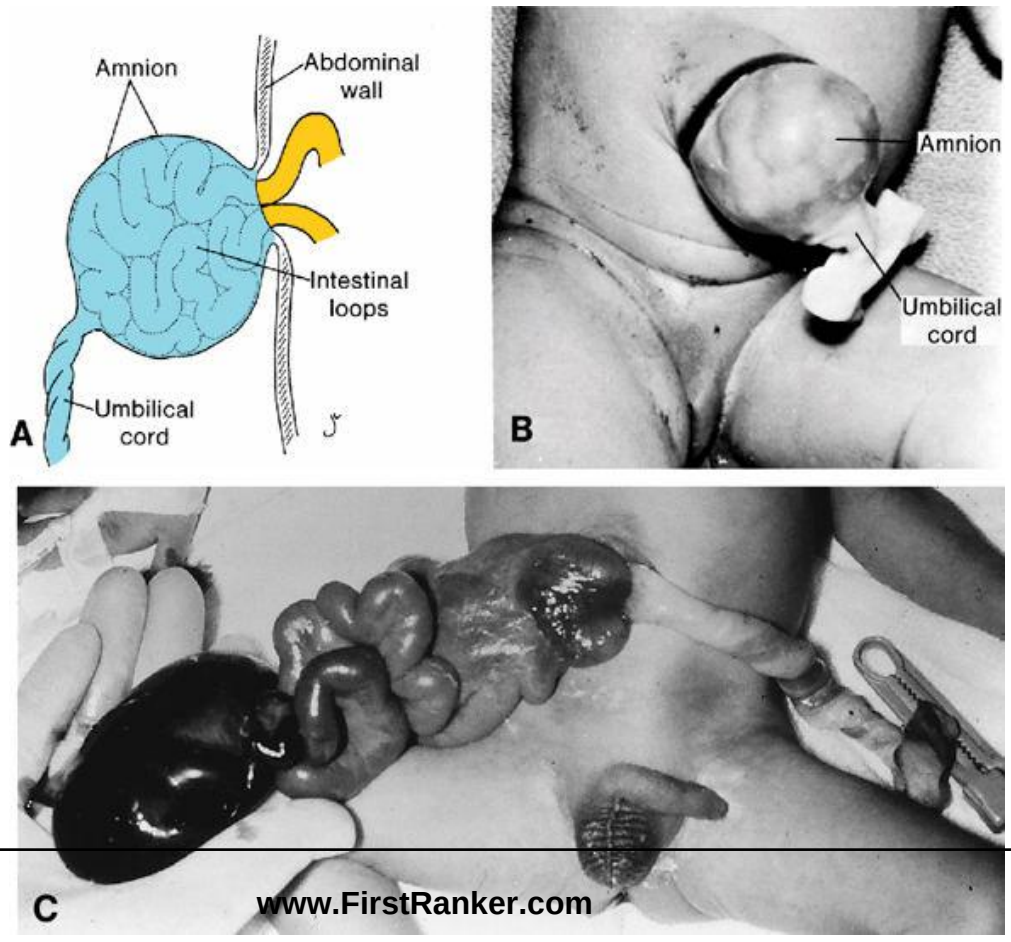
- Site of Porto-caval anastomoses: Portal hypertension causes, *Caput medusae*



Umbilicus

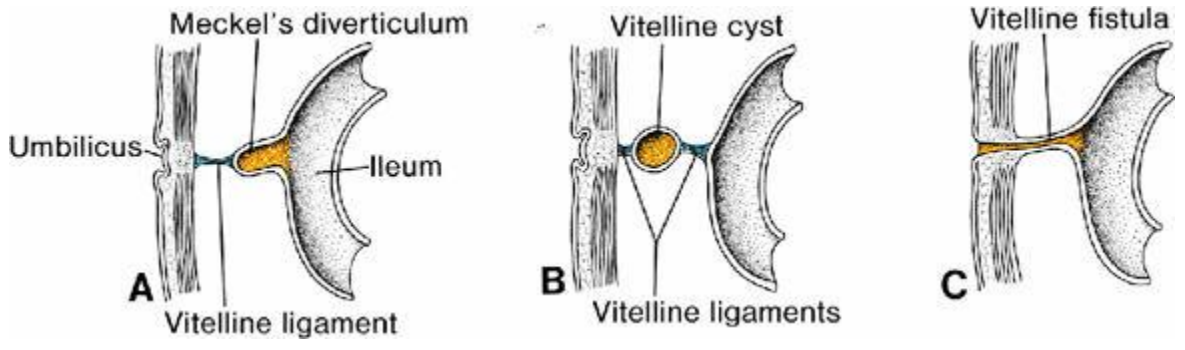
- Rasberry red/Cherry red tumor: Vitellointestinal duct remnant – tumor.
- Weeping of umbilicus: Persistence of urachus
- Exomphalos: Non return of the physiological herniation of the intestinal loop.
- Ectopia vesicae: Failure of development of infraumbilical part of ant. Abd. Wall.
- Umbilical hernia

A. Omphalocele showing failure of the intestinal loops to return to the body cavity after physiological herniation. The herniated loops are covered by amnion. B. Omphalocele in a newborn. C. Newborn with gastroschisis. Loops of bowel return to the body cavity but herniate again through the body wall, usually to the right of the umbilicus in the region of the regressing right umbilical vein.
Unlike omphalocele, the defect is not covered by amnion.

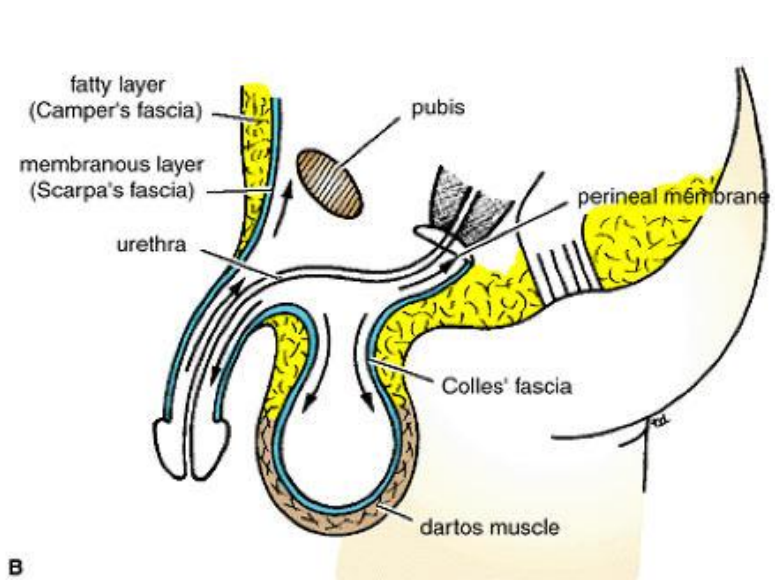


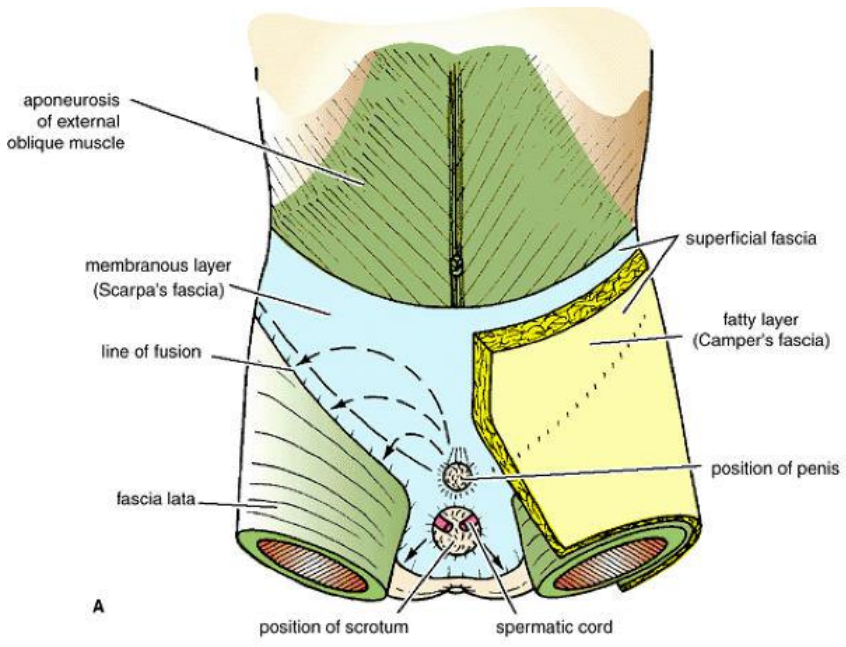
Remnants of the vitelline duct. A. Meckel's, or ileal diverticulum combined with fibrous cord (vitelline ligament). B. Vitelline cyst attached to the umbilicus and wall of the ileum by vitelline ligaments. C. Vitelline fistula connecting the lumen of the ileum with the umbilicus.

(Langman's)



A. Arrangement of the fatty layer and the membranous layer of the superficial fascia in the lower part of the anterior abdominal wall. Note the line of fusion between the membranous layer and the deep fascia of the thigh (fascia lata). **B.** Note the attachment of the membranous layer to the posterior margin of the perineal membrane. Arrows indicate paths taken by urine in cases of ruptured urethra.





Clinical importance:

The membranous layer of the superficial fascia is important clinically because beneath it is a potential closed space that does not open into the thigh but is continuous with the superficial perineal pouch via the penis and scrotum.

Rupture of the penile urethra may be followed by **Extravasation** of urine into the **scrotum, perineum, and penis** and then up into the **lower part of the anterior abdominal wall** deep to the membranous layer of fascia. The urine is **excluded** from the **thigh** because of the attachment of the fascia to the fascia lata .

Clinical Significance of Fascia and Fascial Spaces of Abdominal Wall

- **Liposuction is a surgical method for removing unwanted subcutaneous fat using a percutaneously placed suction tube and high vacuum pressure. The tubes are inserted subdermally through small skin incisions. (REF: SNELL'S)**