



Doctor 021

MSS

A N A T O M Y

#3



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Rectus sheath

Rectus sheath.....cont

- The rectus sheath is a long fibrous sheath
- Formed mainly by the aponeuroses of the three lateral abdominal muscles External, internal and transversus.
- **Contents** These could be an exam question =)
 - Rectus abdominis muscle
 - Pyramidalis muscle (if present)
 - The anterior rami of the lower six thoracic nerves
 - The superior and inferior epigastric vessels
 - Lymphatic vessels.

- It starts from linea semilunaris laterally (lateral edge of rectus abdominis muscle) to linea alba medially.
- It also has an anterior wall and a posterior wall.
- The most important content is the rectus abdominis muscle.
- The rectus sheath is found both sides of linea alba, and sometimes, when we perform abdominal incision, we need to open the sheath, so it is important to know its contents.
- The lower 6 thoracic nerves (intercostal nerves) enter the rectus sheath to supply the rectus abdominis muscle, then they end up as anterior cutaneous nerves (to supply the skin of the abdomen).
- Superior epigastric artery is a branch from the musculophrenic artery which is a branch from the internal thoracic (mammary) artery, which is a branch from subclavian artery.
- Additional note from the writers : google says that both the superior epigastric artery and the musculophrenic artery are the terminal branches of the internal thoracic artery=).
- Inferior epigastric artery is a branch from the external iliac artery.
- External iliac artery gives the inferior epigastric artery then the femoral artery.
- The inferior epigastric has an extreme surgical importance, it allow us to differentiate between direct and indirect inguinal hernia.
- Direct inguinal hernia occurs in the inguinal triangle (which is located in the anterior abdominal wall between the inguinal ligament, linea semilunaris and the inferior epigastric artery).
- Indirect inguinal hernia occurs in the inguinal canal.
- Note that the tendinous intersection is also one of the rectus sheath's contents.

Rectus sheath.....cont

- Description the rectus sheath is considered at three levels. Types of cross sections:

- 1 *Above the costal margin* At the level of xiphoid process
- 2 *Between the costal margin and the level of the anterior superior iliac spine* Around the umbilicus (above or below).
- 3 *Between the level of the anterosuperior iliac spine and the pubis* the anterior wall

It is important to know what constitute the anterior and the posterior walls of the sheath at each level, these could be an exam question †

Please study the figures details carefully

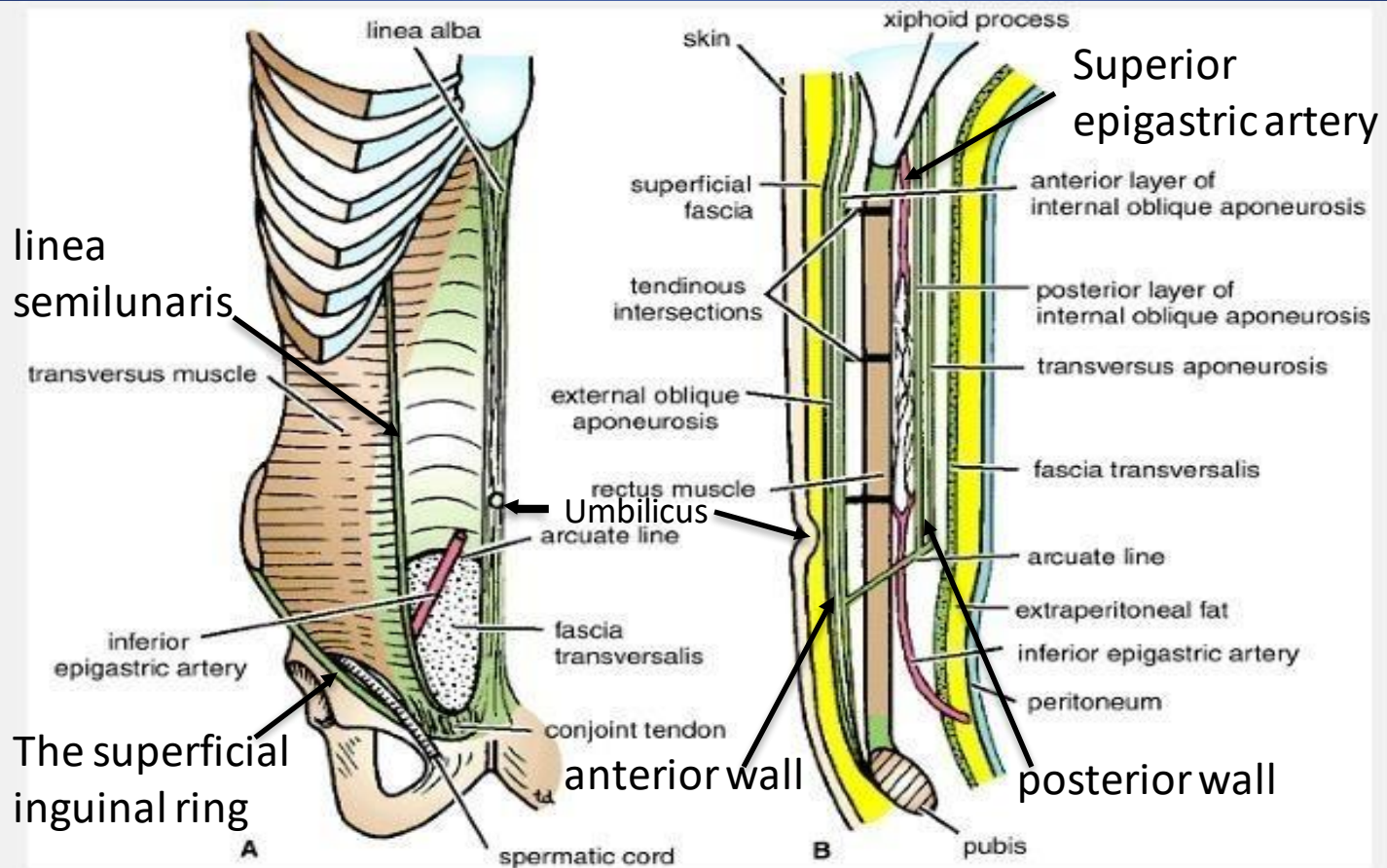
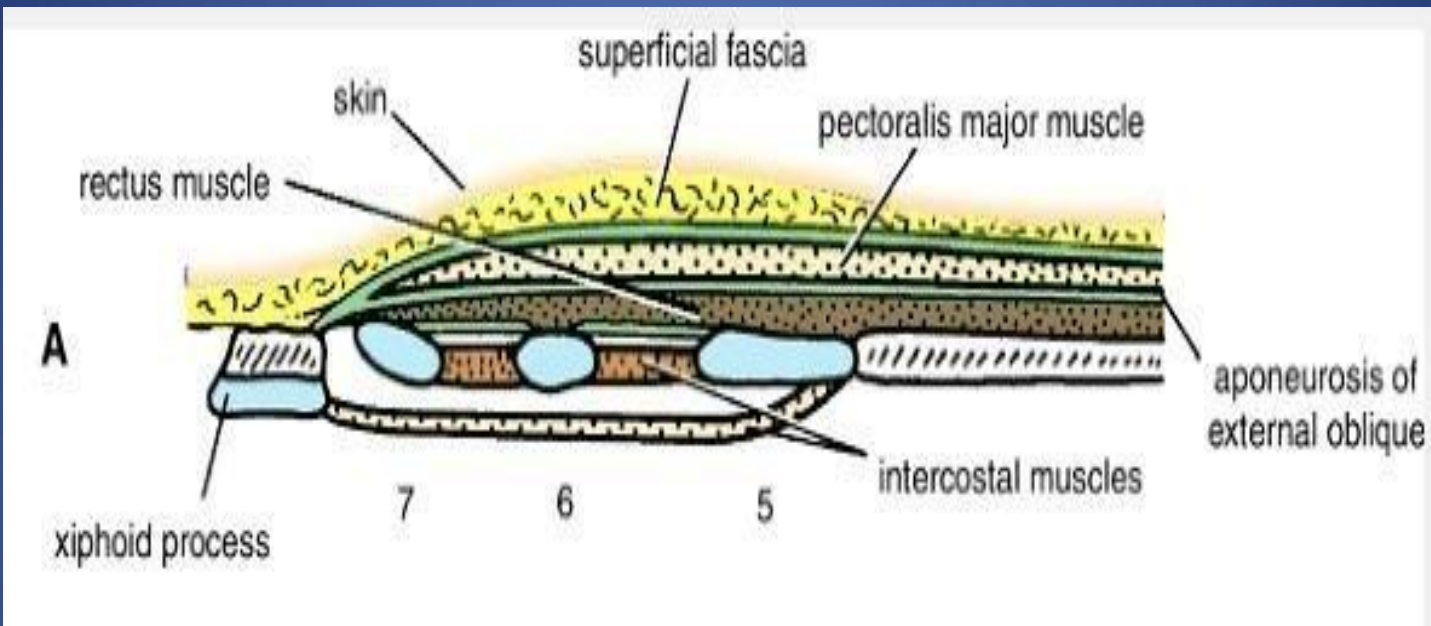


Figure 4-10 Rectus sheath in anterior view (A) and in sagittal section (B). Note the arrangement of the aponeuroses forming the rectus sheath.

Now let's start with the cross sections



ABOVE THE COSTAL MARGIN,

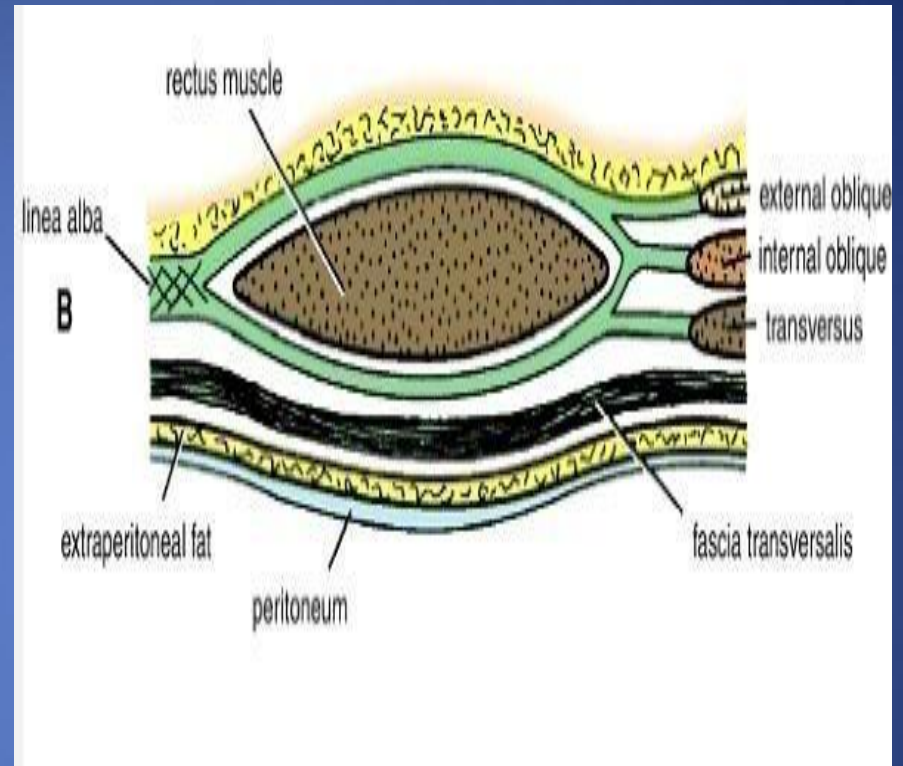
- ANTERIOR WALL # APONEUROSIS OF THE EXTERNAL OBLIQUE.
- POSTERIOR WALL # THORACIC WALL THAT IS, THE FIFTH, SIXTH, AND SEVENTH COSTAL CARTILAGES AND THE INTERCOSTAL SPACES.

Note that:

- Rectus abdominis muscle is inside the sheath.
- Anteriorly, and besides the aponeurosis of the external oblique, there are skin, superficial fascia and pectoralis major muscle.
- The posterior wall has intercostal muscles.

*Between the costal margin
and the level of the anterior
superior iliac spine*

- The aponeurosis of the internal oblique splits to enclose the rectus muscle
- the external oblique aponeurosis is directed in front of the muscle
- the transversus aponeurosis is directed behind the muscle.



Note that:

- Again, rectus abdominis muscle is inside the sheath, (this is supposed to guide you =)).
- Anteriorly, and besides the aponeuroses of the external oblique and the anterior part of the internal oblique, there are skin and superficial fascia.
- Posteriorly, and besides the aponeuroses of the **posterior** part of the internal oblique and the transversus, there are fascia transversalis, extra peritoneal fat and parietal peritoneum.

Between the level of the anterosuperior iliac spine and the pubis

the anterior wall : the aponeurosis of all three muscles form.

The posterior wall is absent, and the rectus muscle lies in contact with the fascia transversalis.

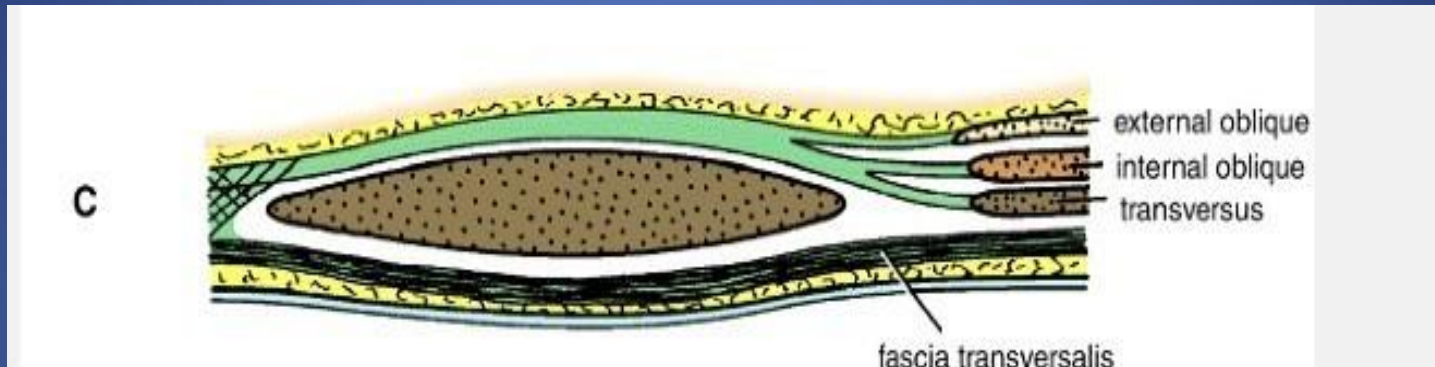


Figure 4-13 Transverse sections of the rectus sheath seen at three levels. **A.** Above the costal margin. **B.** Between the costal margin and the level of the anterior superior iliac spine. **C.** Below the level of the anterior superior iliac spine and above the pubis.

Note that:

- Again, rectus abdominis muscle is inside the sheath.
- Anteriorly, and besides the aponeuroses of the three muscles, there are skin and superficial fascia.
- Posteriorly, and besides the fascia transversalis, there are extra peritoneal fat and parietal peritoneum.

Rectus sheath.....cont

- The posterior wall of the rectus sheath is not attached to the rectus abdominis muscle. The anterior wall is firmly attached to it by the muscle's tendinous intersections

So the arteries and vessels are found between the muscle and the posterior wall.

- **Linea semicircularis** (arcuate line)
- Is a crescent-shaped line marking the inferior limit of the posterior layer of the rectus sheath just below the level of the iliac crest.

Only below the level of the arcuate line we can see fascia transversalis.

Now try it on your own, at which level each one of these cross section are taken?

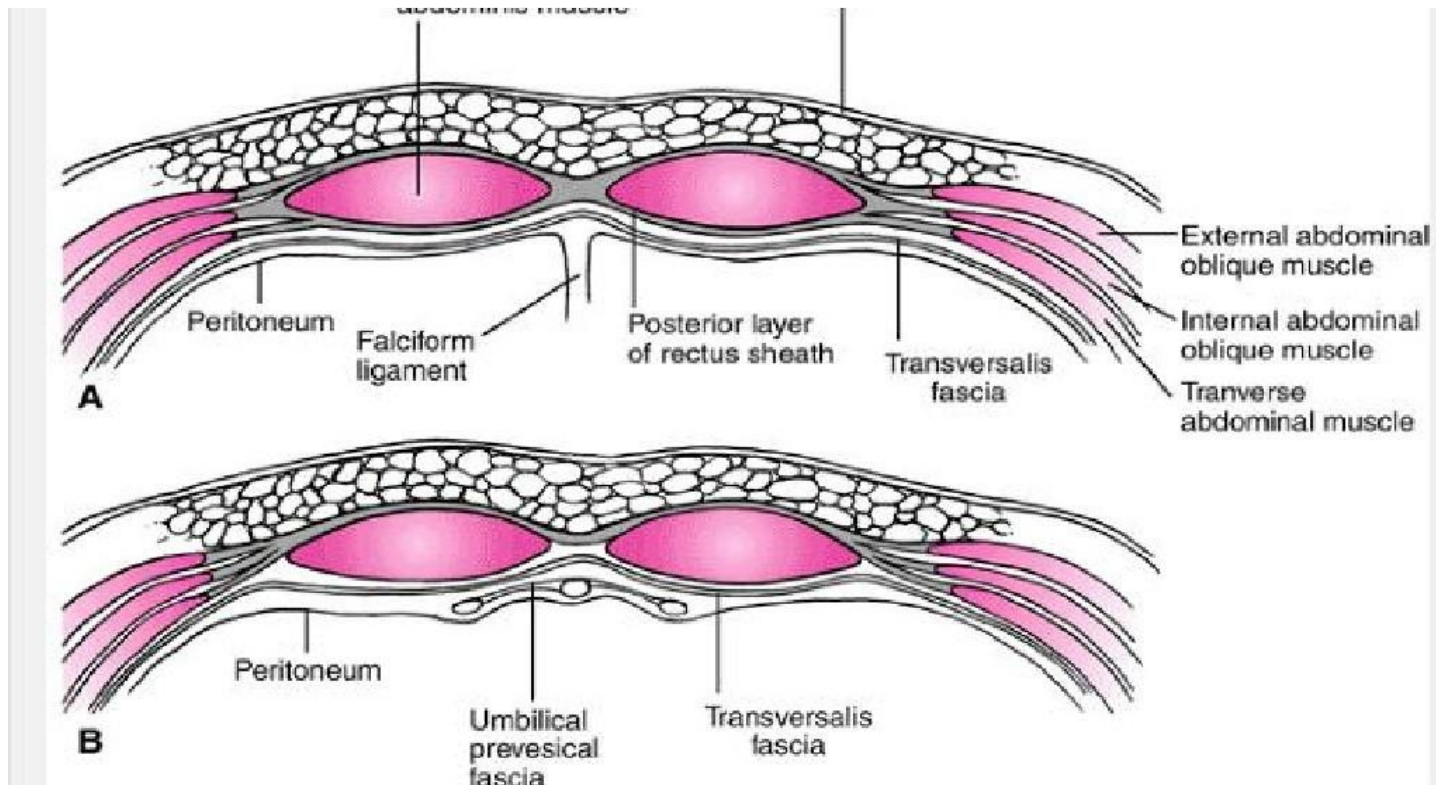


Figure 5-2 Arrangement of the rectus sheath above the umbilicus (upper) and below the arcuate line (lower).

A: Between the costal margin and the level of the anterior superior iliac spine, note that the aponeurosis of the internal oblique is splitted.

B: Between the level of the anterosuperior iliac spine and the pubis, note that the aponeuroses of the three muscles are located anteriorly, and the transversalis fascia is located posteriorly.

Others fascia in the ant. abdominal wall

❖ Transversalis fascia

- a thin layer of fascia that lines the Transversus Abdominis muscle Deep to it, posteriorly
- continue to diaphragm , iliac muscle & pelvis fascia
- contribute to femoral sheath

❖ Extraperitoneal Fascia

- ✓ The thin layer of C.T and adipose tissue between the peritoneum and fascia transversalis.

❖ Parietal peritoneum

- ✓ It is a thin serous membrane
- ✓ Continuous below with the parietal peritoneum lining the pelvis.

It surrounds the abdominal cavity

Action of the Ant. Abdominal muscle

- Deep expiration or
 - Increase the intra abdominal pressure in
 - Vomiting During vomiting the anterior abdominal muscles empty the stomach.
 - Cough
 - Defecation Especially in case of constipation, this can cause hernia.
 - Labour That's why gynecologists advise pregnant women to exercise, because these muscles are involved in labour.
 - Urination (micturition)
 - Protect viscera During contraction only.
 - keep viscera in position The intra abdominal pressure keeps the viscera in position
 - Rectus abdominis ↑ bends trunk forward
- The intra abdominal pressure and the abdominal muscles are important in lifting of heavy objects, that's why weightlifters usually wear large belts around their abdomen.

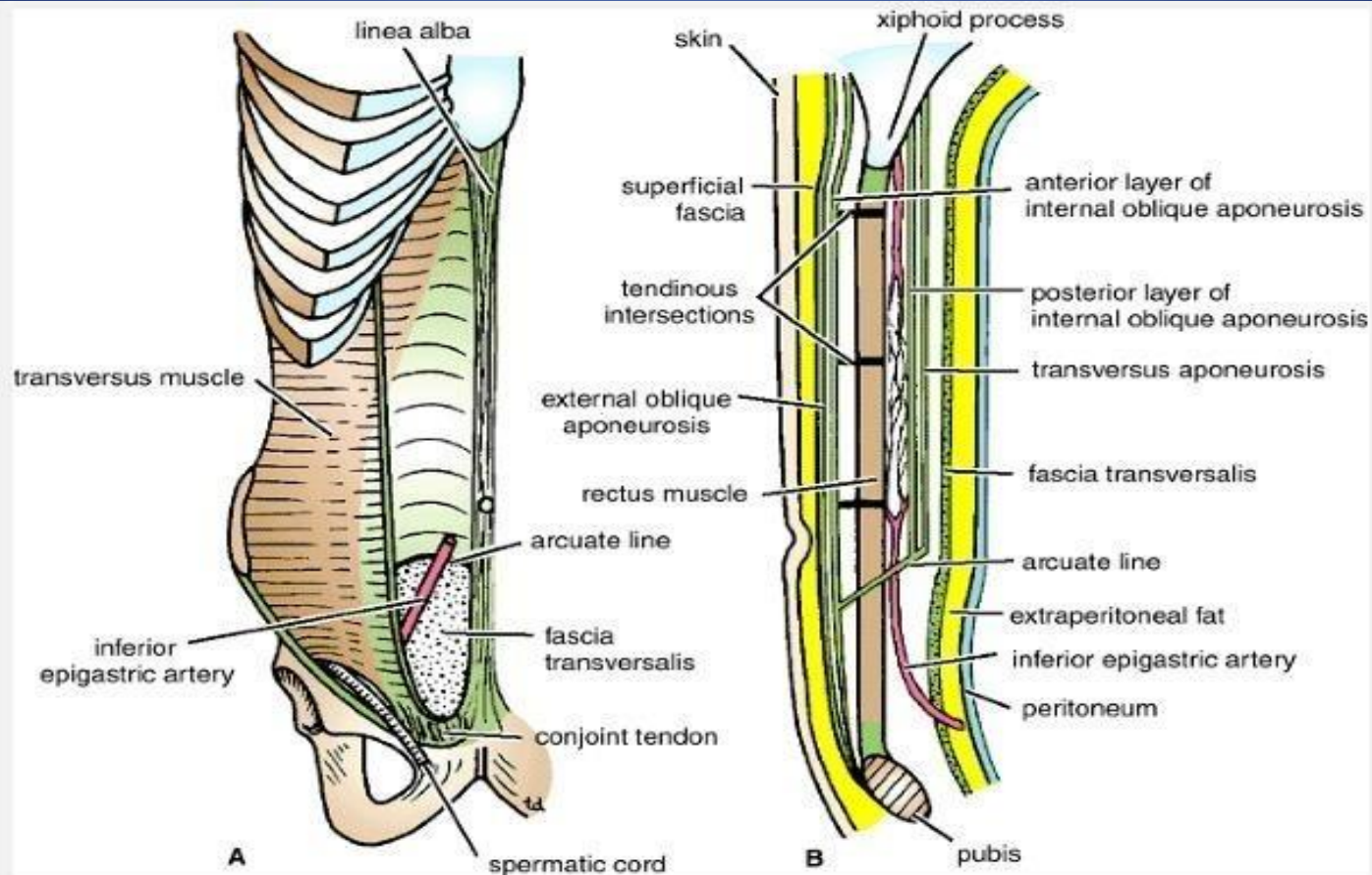
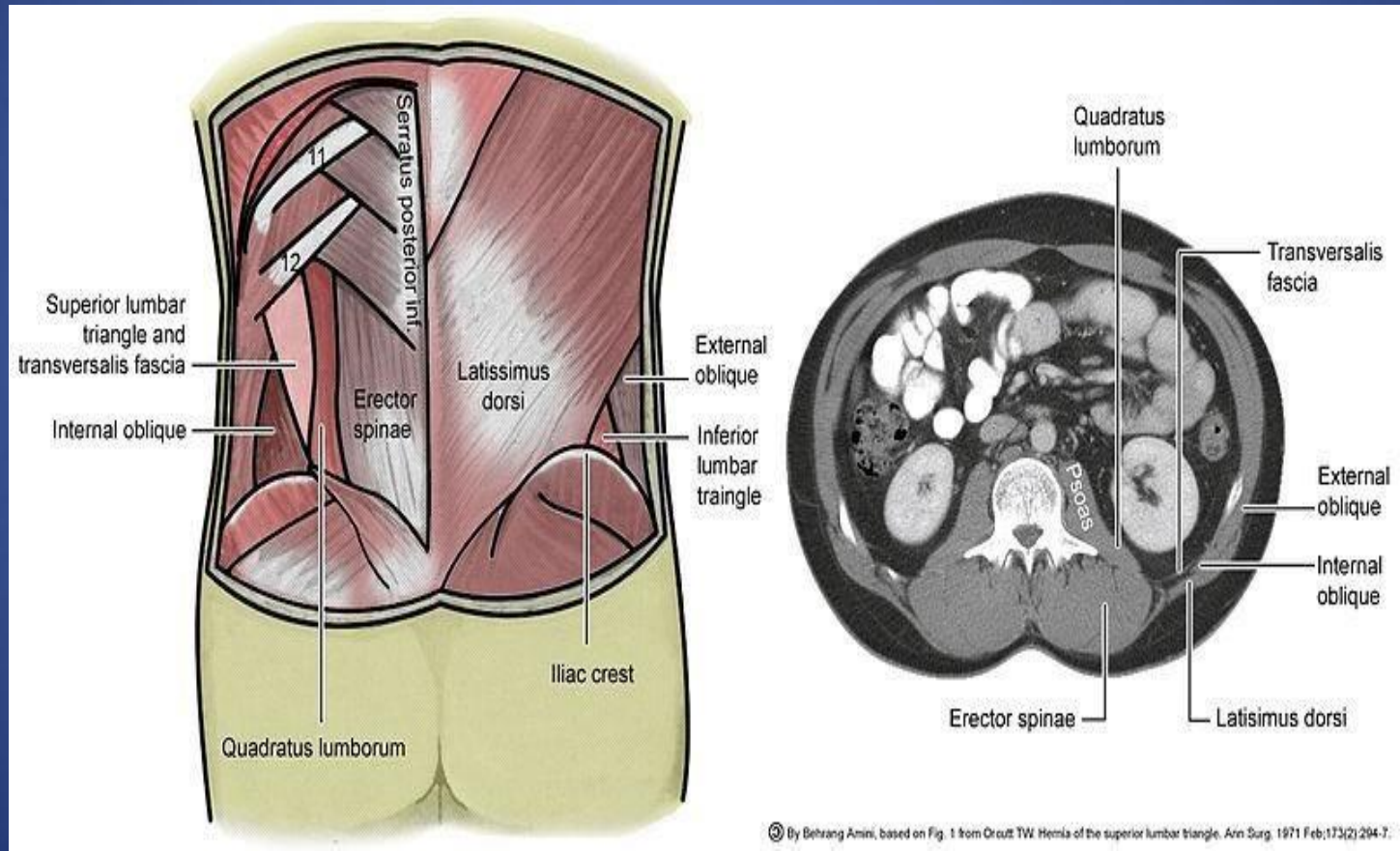


Figure 4-10 Rectus sheath in anterior view (A) and in sagittal section (B). Note the arrangement of the aponeuroses forming the rectus sheath.

Not included

Lumbar triangle



lumbar triangle

- 1- the inferior lumbar (Petit) triangle, which lies superficially
 - 2- the superior lumbar (Grynfeltt) triangle, which is deep and superior to the inferior triangle.
- Of the two, the superior triangle is the more consistently found in cadavers, and is more commonly the site of herniation
 - however, the inferior lumbar triangle is often simply called the lumbar triangle, perhaps owing to its more superficial location and ease in demonstration.

Lumber triangle(petitis)

- The inferior lumbar (Petit) triangle is formed
 - **Medially** by the latissimus dorsi muscle
 - **laterally** by the external abdominal oblique muscle
 - **Inferiorly** by the iliac crest
 - **The floor** internal abdominal oblique muscle.
- The fact that herniation occasionally occur here is of clinical importance.

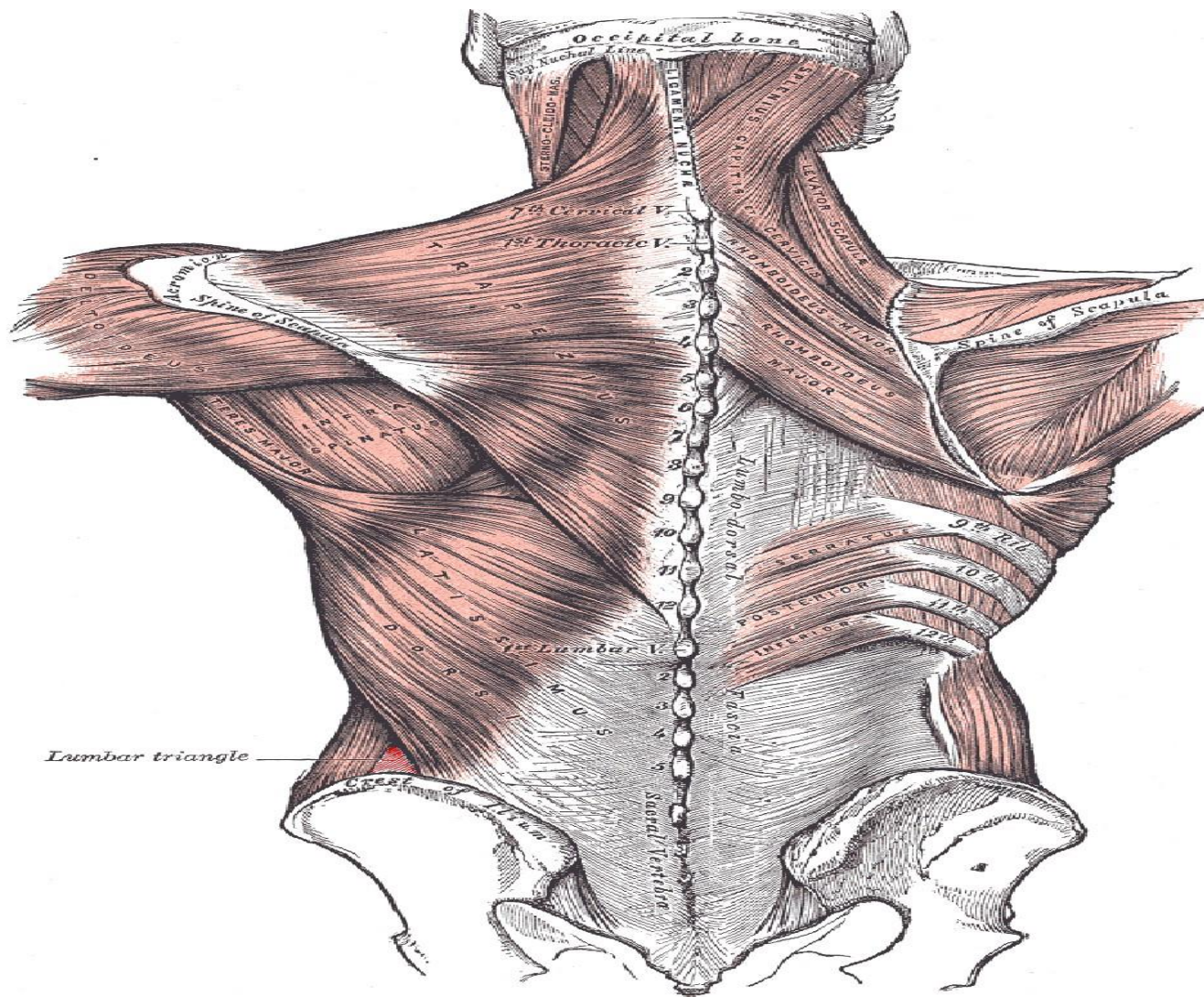
Superior lumbar (Grynfeltt-Lesshaft) triangle

Medially: by the quadratus lumborum muscle **laterally** :by the internal abdominal oblique muscle **Superiorly:** by the 12th rib.

The floor : transversalis fascia

Roof: is the external abdominal oblique muscle

Read-only

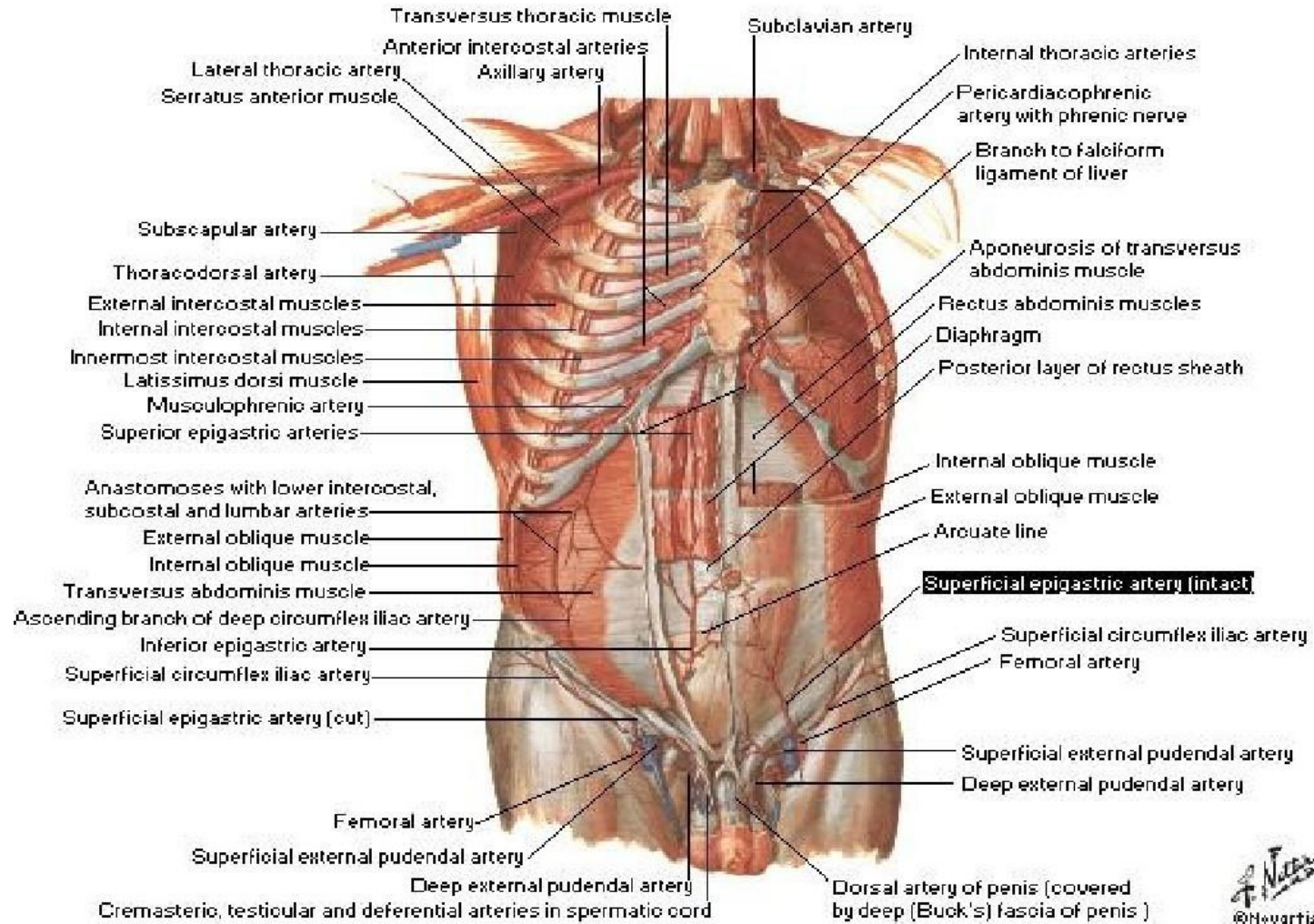


Blood supply of the ant. Abdominal wall

Arteries

- Sup. Epigastric artery
- Inf. Epigastric artery
- Intercostal arteries
- Lumbar arteries
- Deep circumflex artery

Arteries of Anterior Abdominal Wall



Blood supply.....cont

Veins

1- Above the umbilicus

- Lat. Thoracic. vein. † Axillary vein

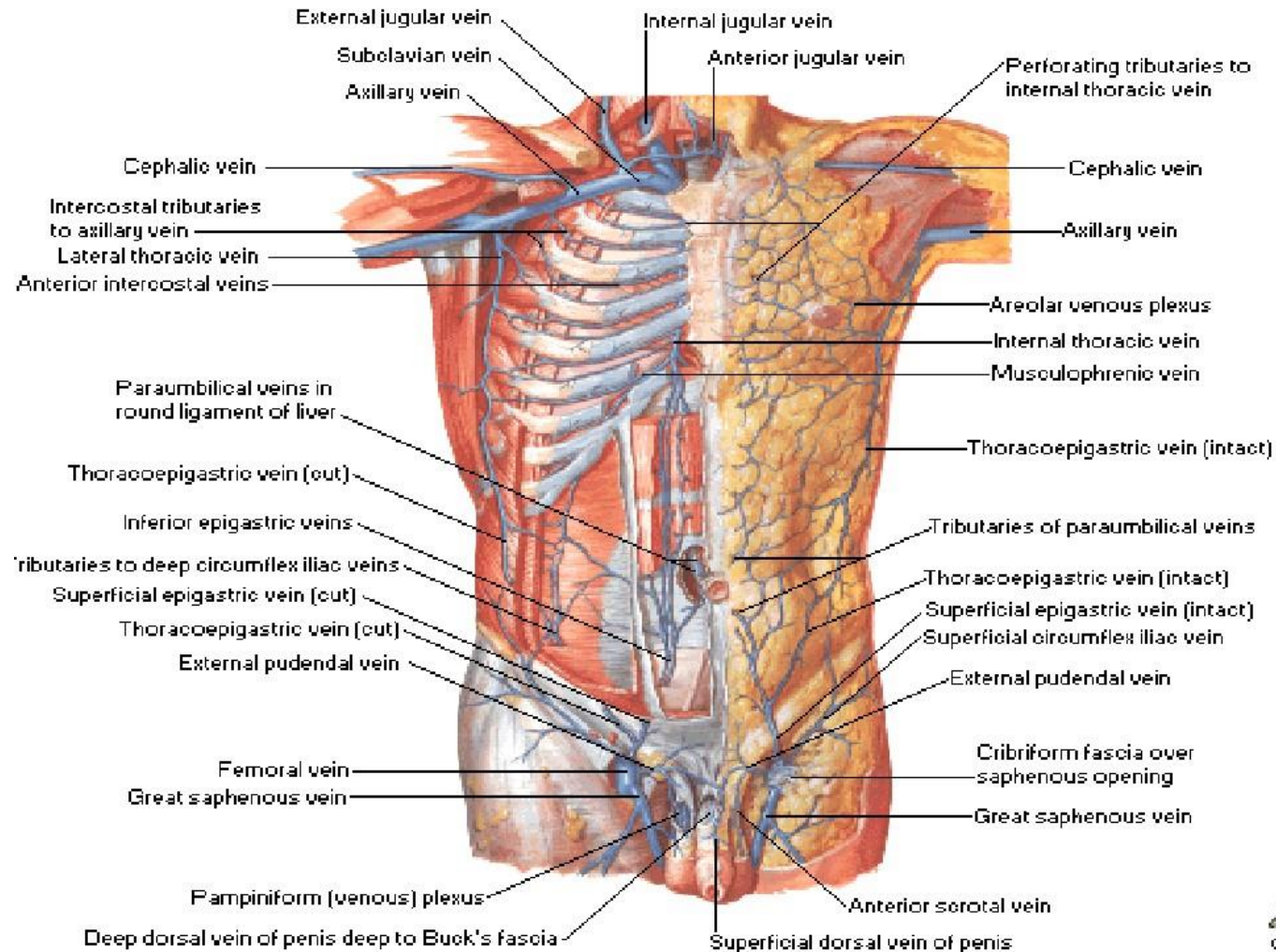
2- Below the umbilicus

- Inf. Epigastric † Femoral vein

3- Paraumbilica veins

- Ligamentum teres † portal vein(Porto- systemic anastomosis)

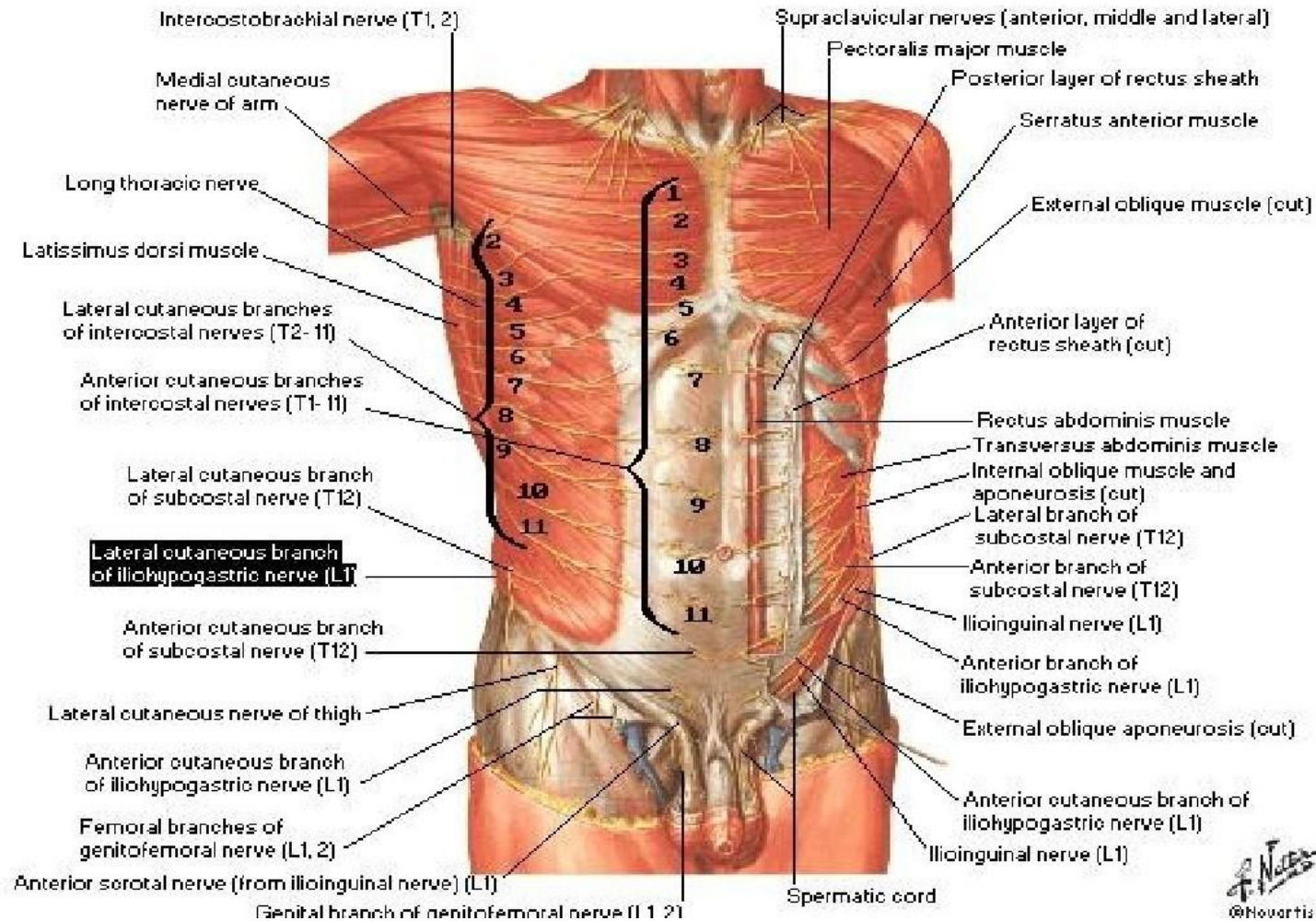
Veins of Anterior Abdominal Wall



Nerve supply of the ant. Abdominal wall

- **Thoracoabdominal nerve:** Lower 6th thoracic nerves & 12th subcostal nerve
- **Dermatomes** (Anterior, lateral cutaneous nerve terminal branches of Thoracoabdominal nerve)
 - T7 to skin superior to umbilicus below xiphoid process
 - T10 to skin surrounding umbilicus
 - L1 to skin inferior to umbilicus above sym.pubis
- **L1 nerve**
 - Iliohypogastric nerve
 - Ilioinguinal nerve

Nerves of Anterior Abdominal Wall



Lymphatic drainage of ant. Abdominal wall

- Above the umbilicus □ Ant.axillary L.N
- Below the umbilicus † Sup. Inguinal L.N
- Above the iliac crest □ Post.axillary.L.N
- Below the iliac crest † Sup.inguinal L.N

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Clinical notes

Abdominal stab wounds

Surgical incision

Abdominal stab wounds

- Lateral to rectus sheath
- Ant. To rectus sheath
- In the midline= Linea alba
- Structures in the various layers through which an abdominal stab wound depend on the anatomical location

Surgical incision

- The length and direction of surgical incision through the ant. Abdominal wall to expose the underlying viscera are largely controlled by
 - 1- position & direction of nerves
 - 2- direction of muscle fibers
 - 3- arrangement of the apponeurosis forming the rectus sheath
- The incision should be made in the direction of the line of cleavage in the skin so that the hairline scar is produced

Incision through the rectus sheath

- Widely used
- The rectus abdominis muscle and its nerve supply are kept intact
- On closure the ant & post wall of the sheath are sutured separately and the rectus muscle back into position between the suture lines

Common types of incisions

- Paramedian incision
- Pararectus incision
- Midline incision
- Transrectus incision
- Transverse incision
- Muscle splitting
- Abdominothoracic incision

V2

Slide #8

Note that:

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