

UNIVERSITAS CAROLINA PRAGENSIS

Charles University in Prague - 1st Faculty of Medicine



Muscles of the thorax, abdomen, inguinal canal

Institute of Anatomy

Author: Oldřich Eliška

Subject: General Medicine - Anatomy 1

Muscles of the chest

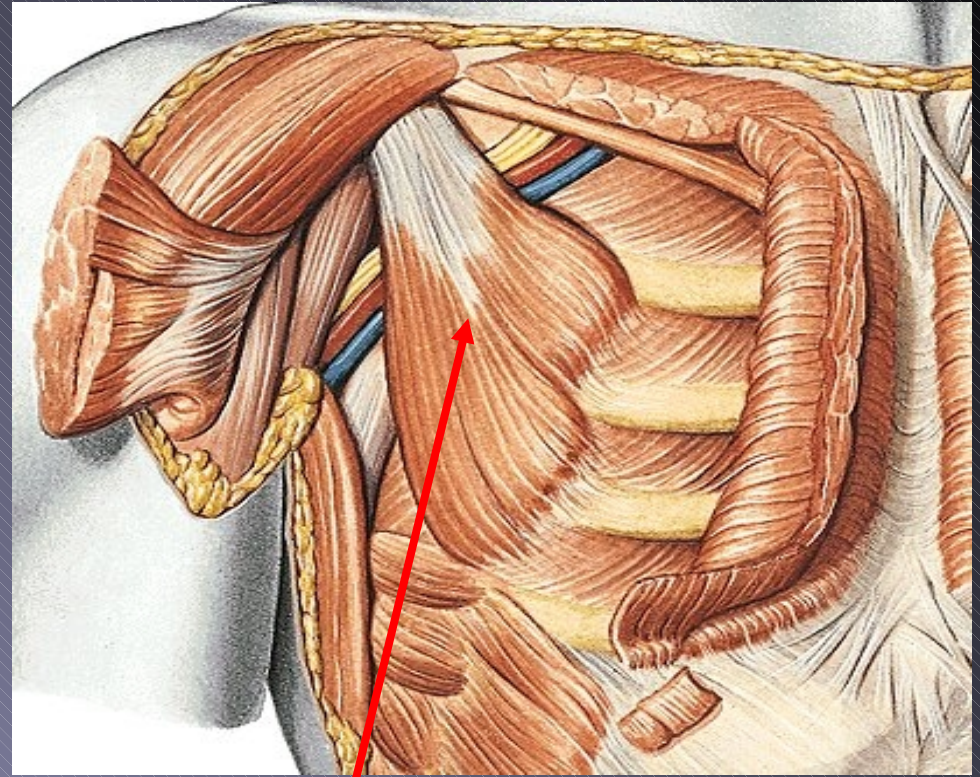
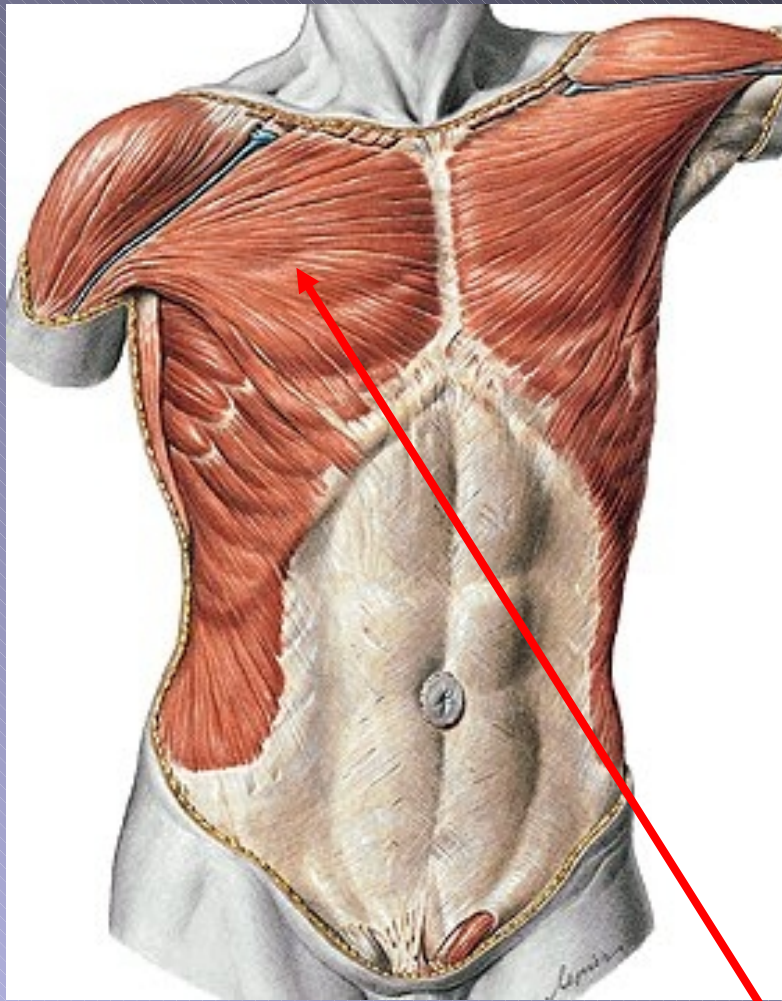
- **thoraco-humeral muscles**

**pectoralis major and minor
subclavius m., serratus anterior m.**

- **proper chest muscles**

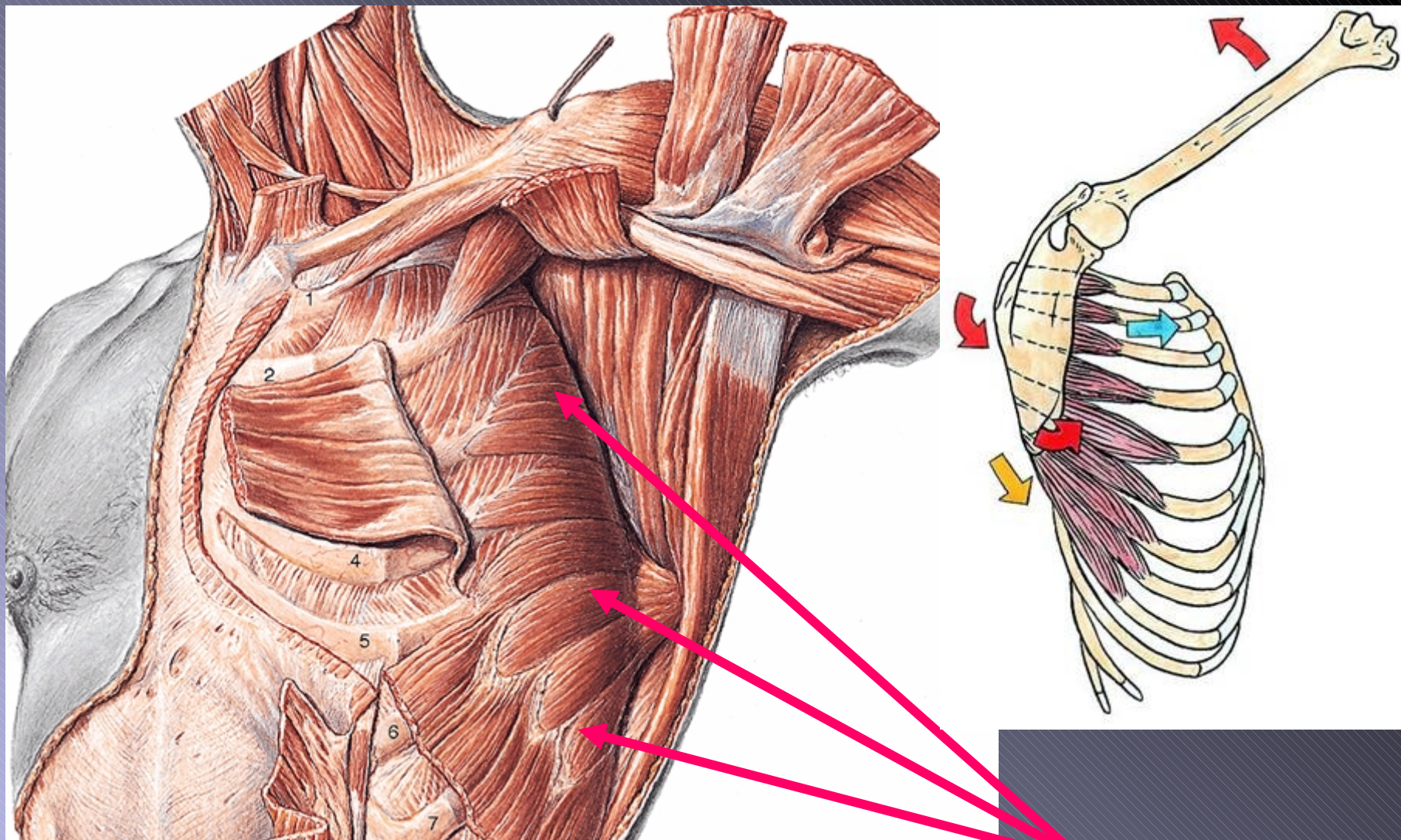
**external, internal and innermost
intercostal mm., subcostal mm.,
transversus thoracis m.**

- **diaphragm**



pectoralis major and minor

Innervation: medial and lateral pectoral nerves



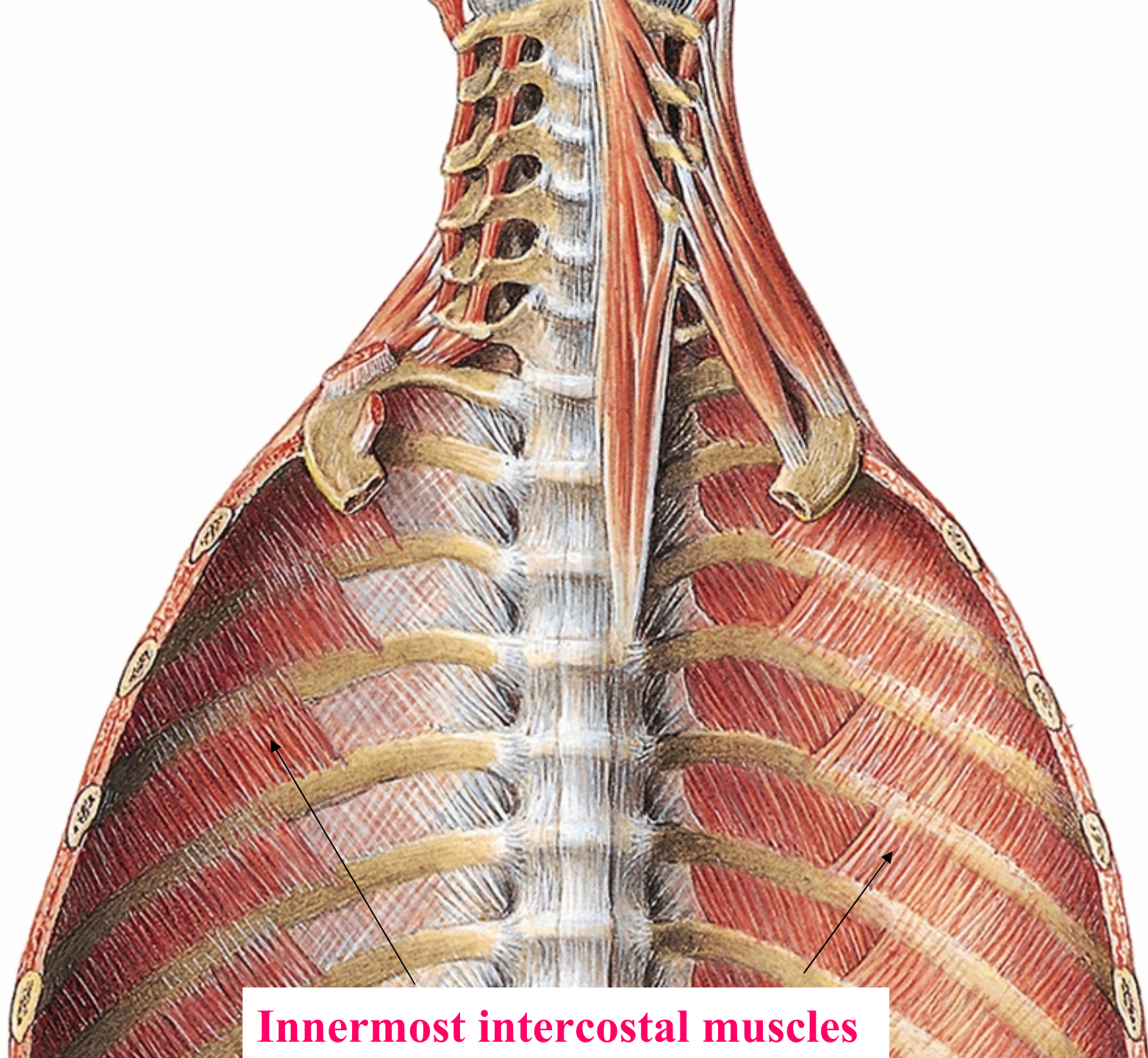
**serratus anterior muscle – from
medial margin of scapula to 1st – 9th rib
In. Long thoracic nerve – palsy: winging scapula**



External, internal and innermost intercostal Muscles

Internal and external intercostal membrane

intercostal nn. Th1 - Th12



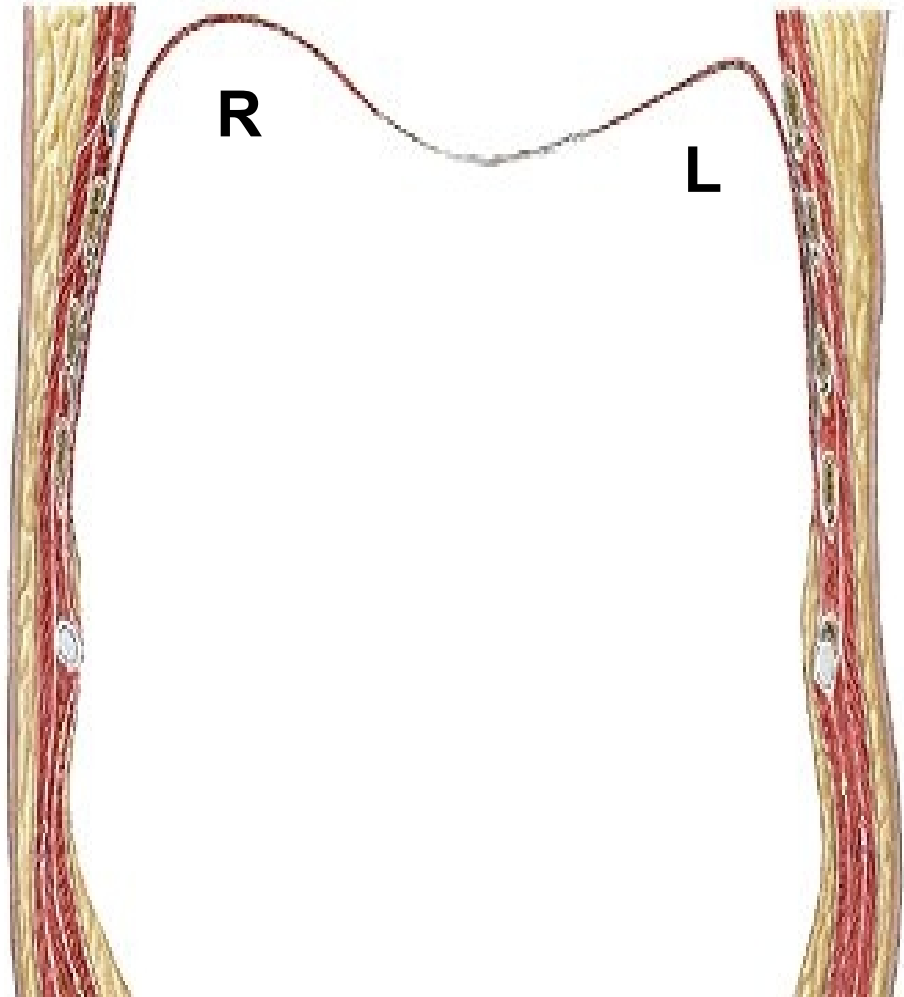
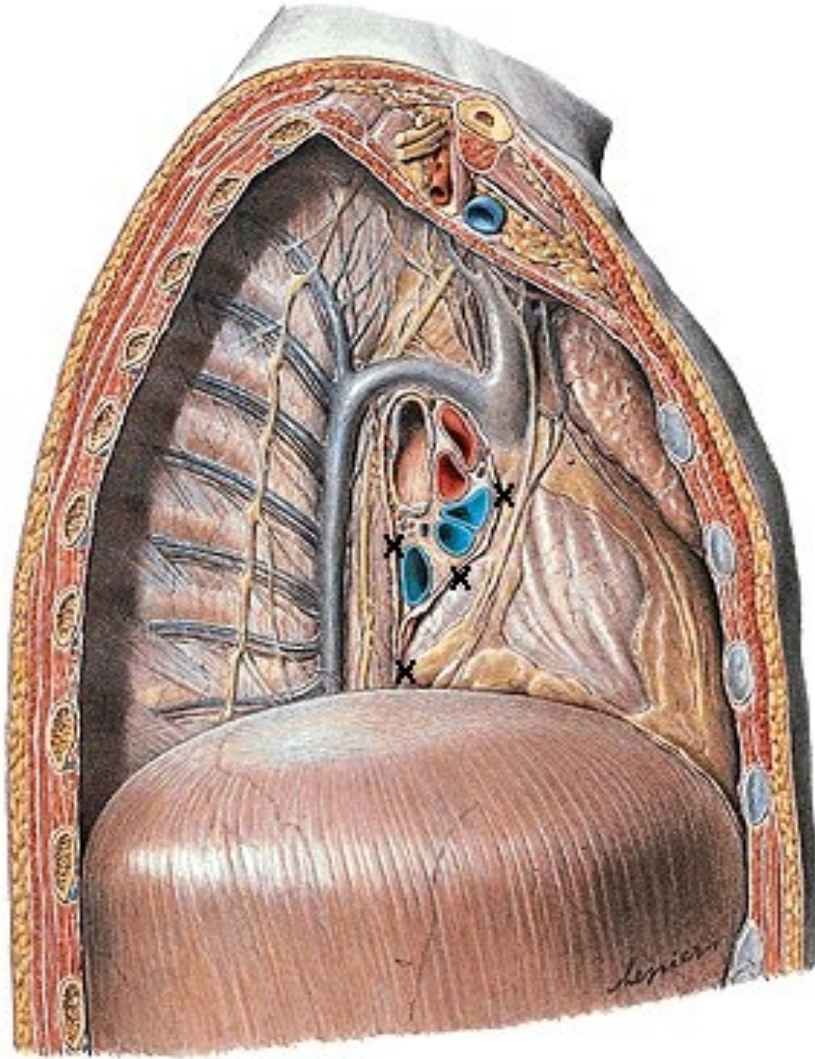
Innermost intercostal muscles



Intercostal neurovascular bundle:
v. + a. + n.
intercostalis
(VAN)

Pleural tap –
posterior
axillary line, 8th
intercostal
space

The Diaphragm



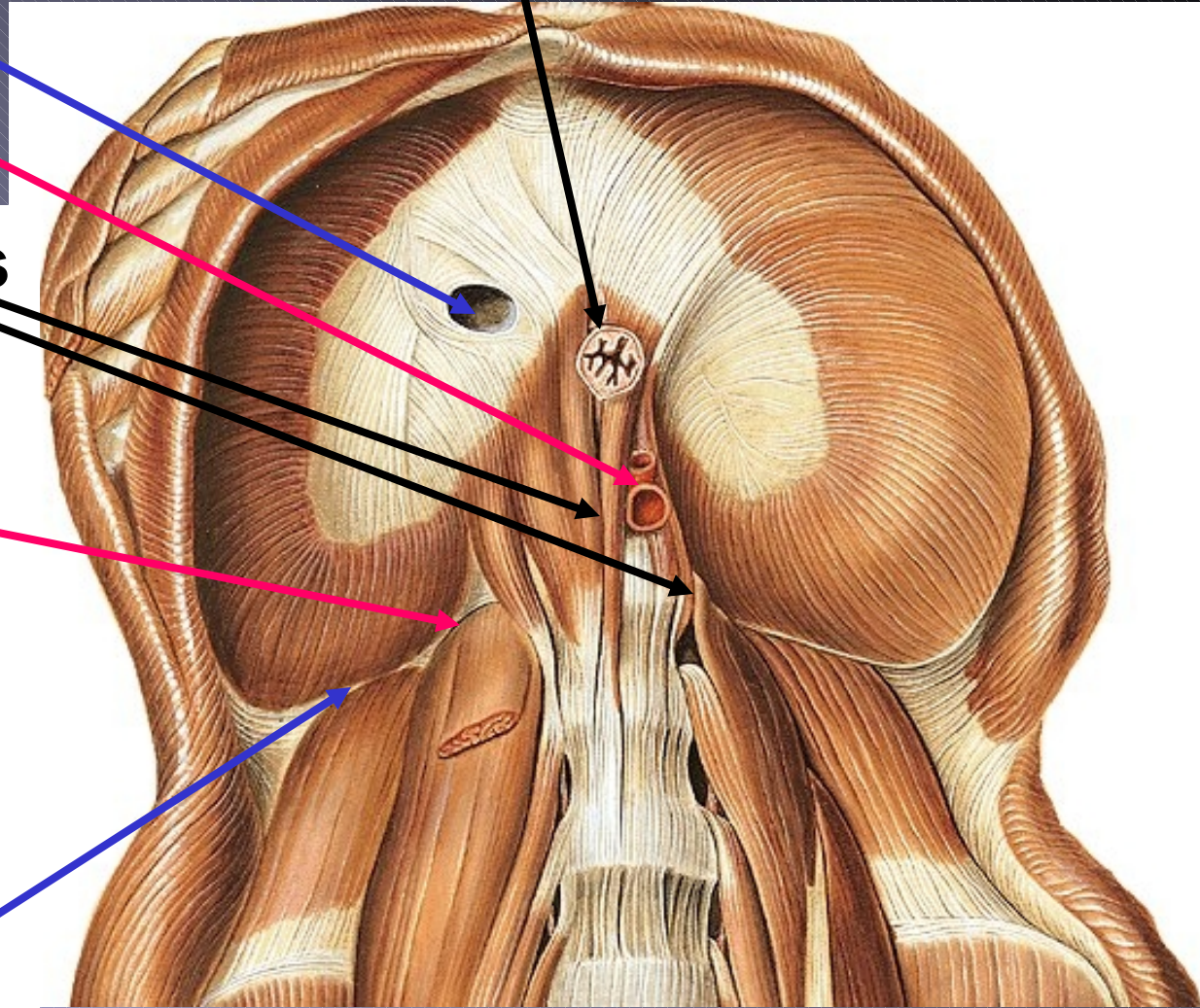
Domes of the diaphragm:
Right side – 4th intercostal space, left – 5th

Sternal, costal, and lumbar part; centrum tendineum
Foramen venae cavae, hiatus oesophageus,
hiatus aorticus

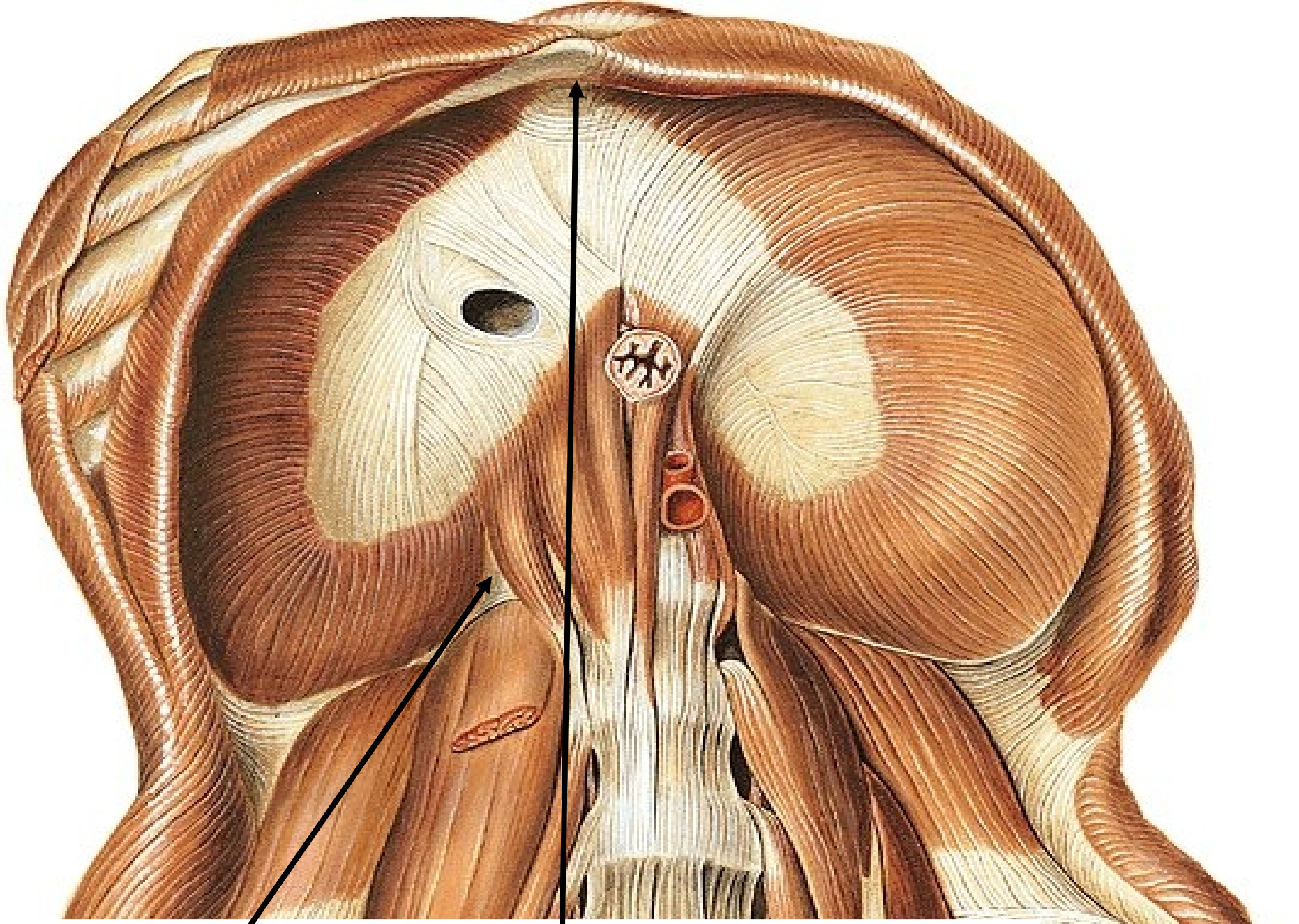
Right and left crus

Medial arcuate
ligament
(psoatic arcade)

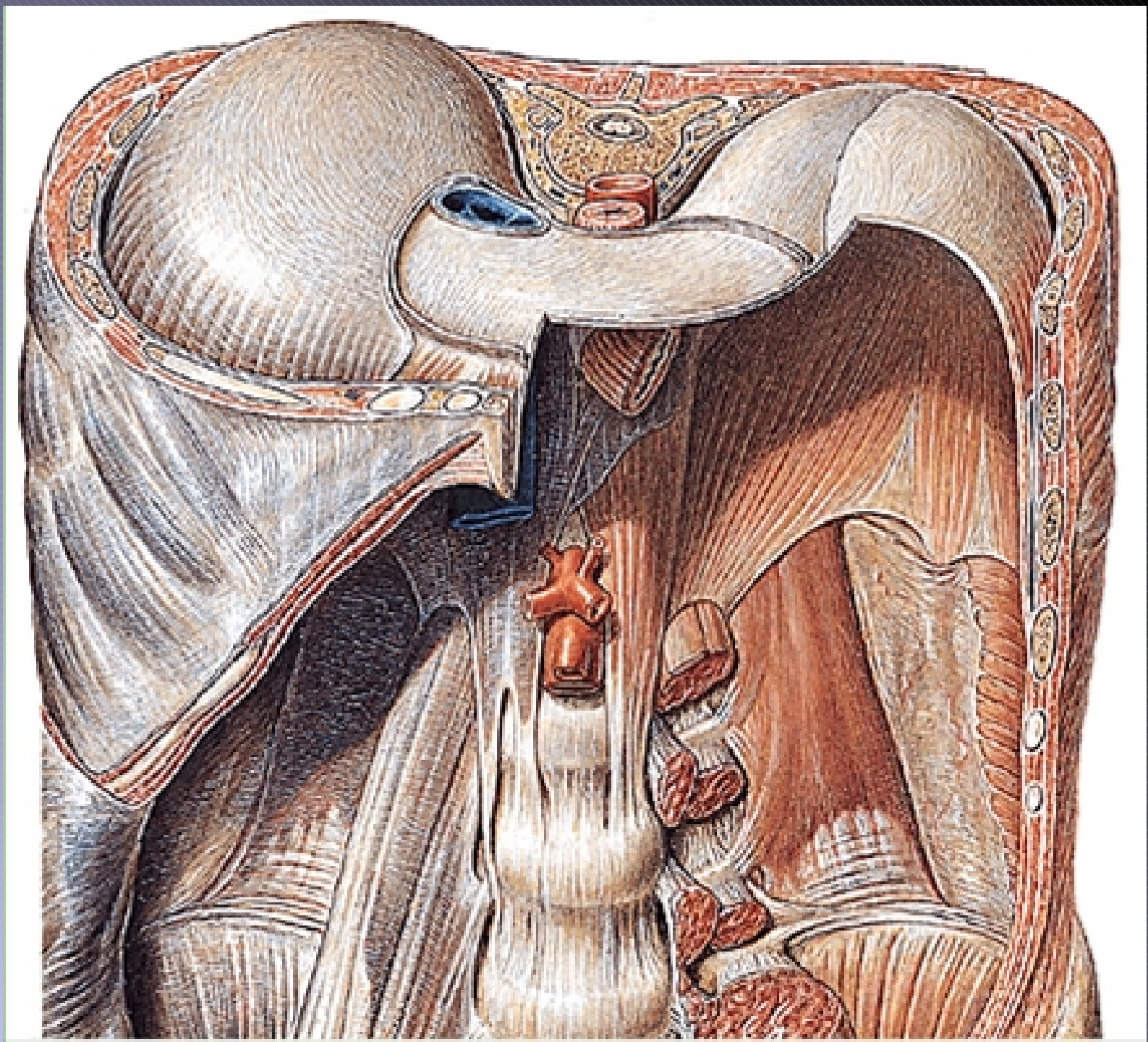
Lateral arcuate
ligament
(over quadratus
lumborum)



Inn. by phrenic nerve (C3 – C5)



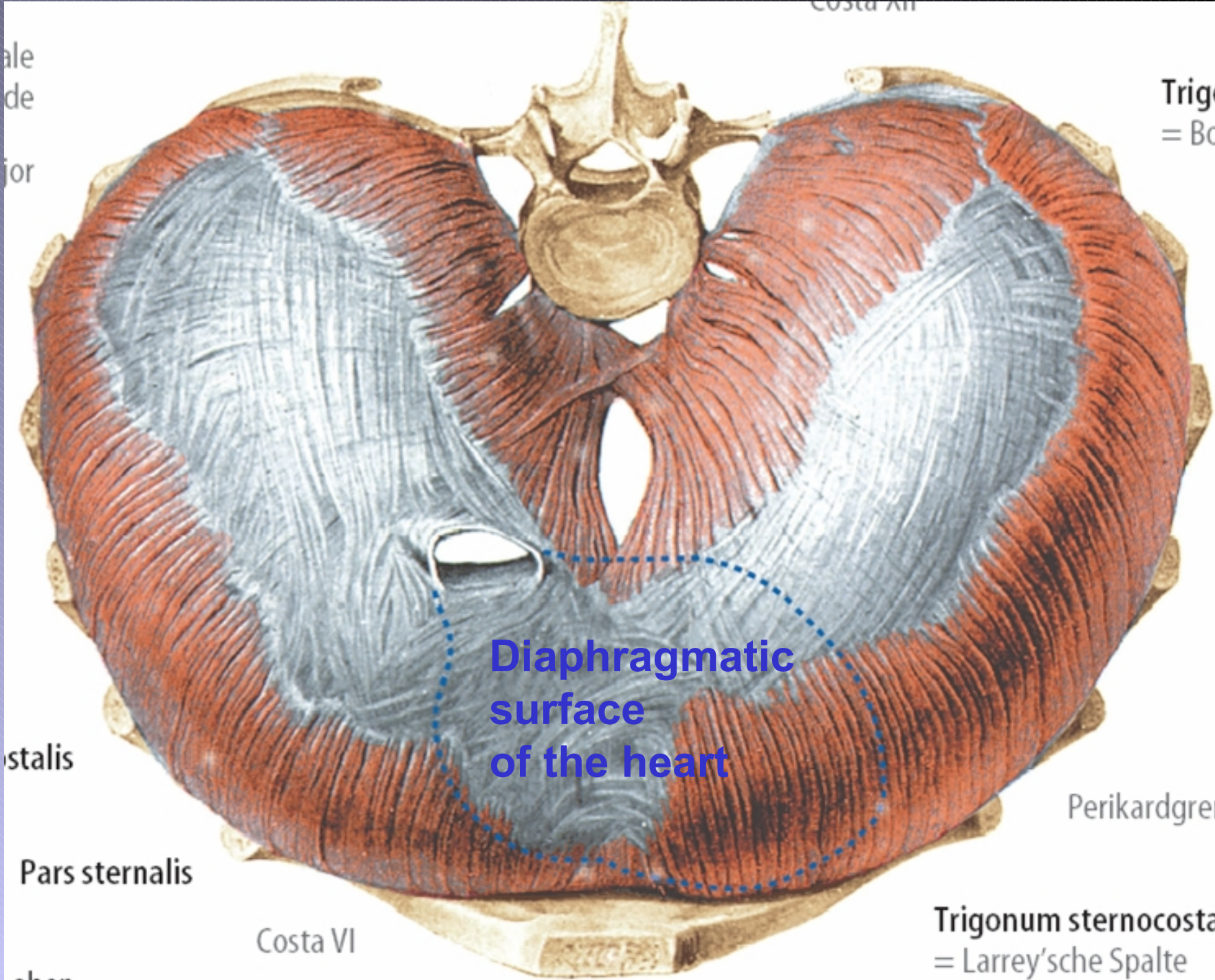
Lumbocostal and sternocostal trigonum



ale
de
for

Costa XII

Trig
= Bo



stalis

Pars sternalis

Costa VI

ohen

Diaphragmatic
surface
of the heart

Perikardgre

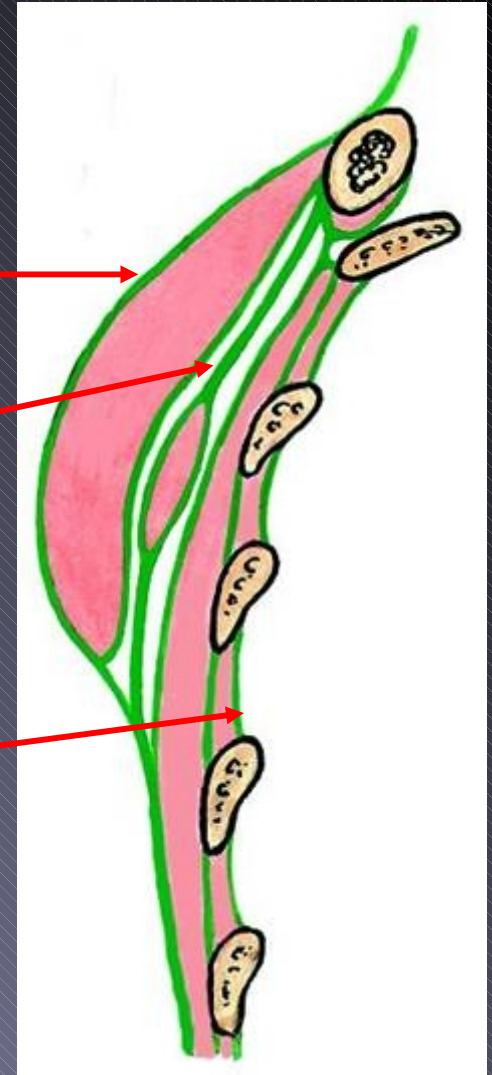
Trigonum sternocosta
= Larrey'sche Spalte

Fascias of the chest

Superficial pectoral fascia

Clavipectoral fascia
– fossa ovalis infraclavicularis

Endothoracic fascia
(Sibson's)



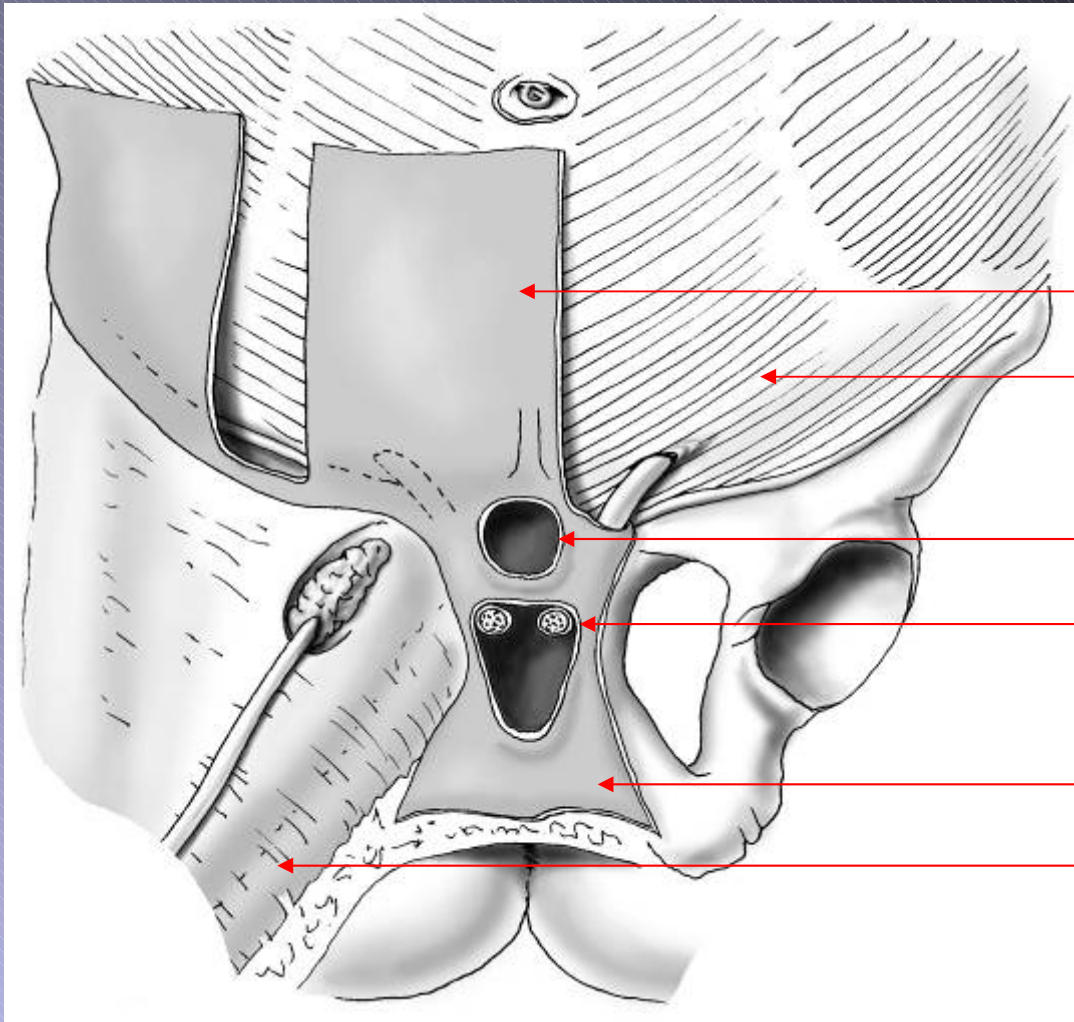
Muscles of the abdomen -
inguinal canal.

Surgical approaches to the
abdominal cavity.

Vessels and nerves of
abdominal wall.

Abdominal fascias

- **Camper's fascia**
- **Fascia abdominis subcutanea (Scarpe's fascia) – superficial, continues as f. perinei superficialis.**
- **Fascia abdominis superficialis => fascia spermatica externa**
- **Fascia transversalis (endoabdominalis) – septum femorale – fascia spermatica interna**



fascia abdominis subcutanea

fascia abdominis superficialis

fascia penis superficialis

transition to tunica dartos

fascia superficialis perinei

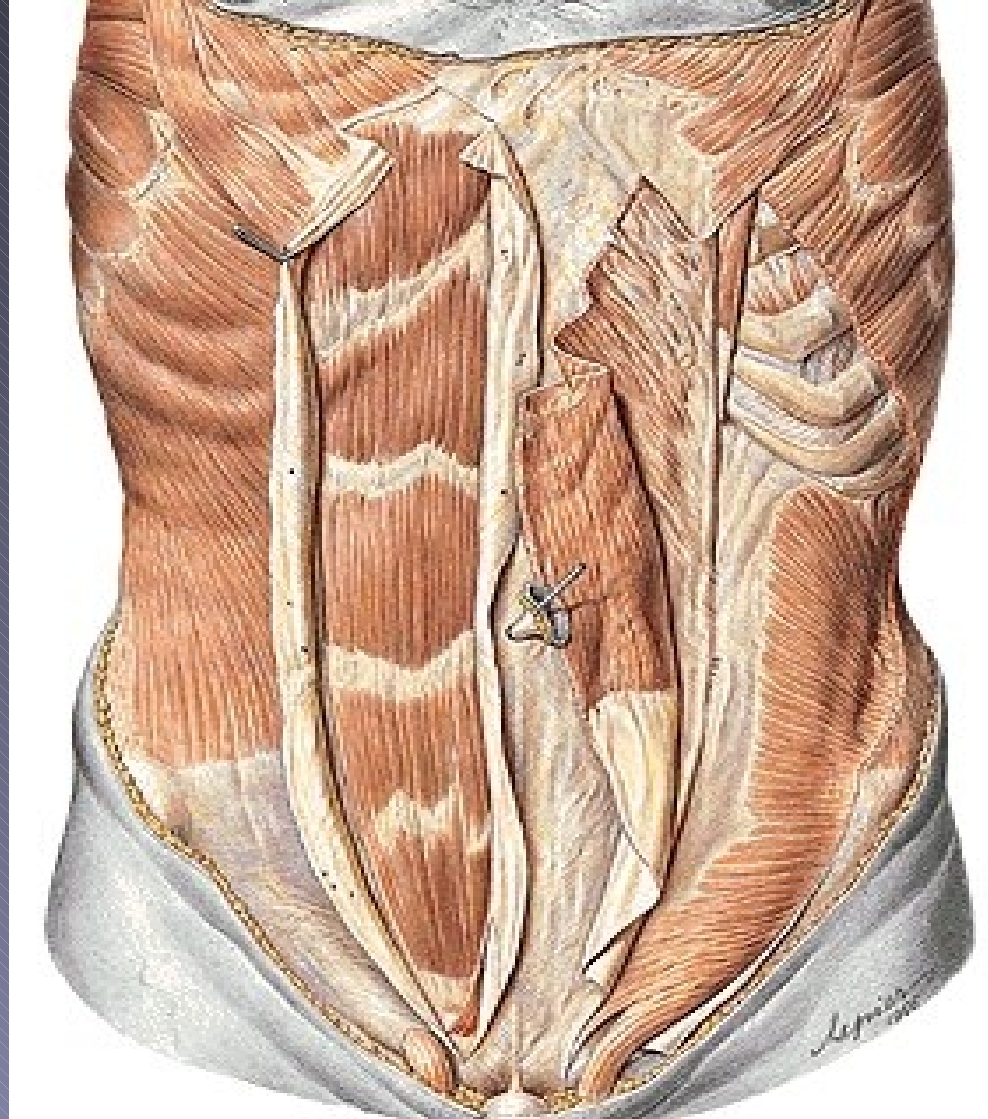
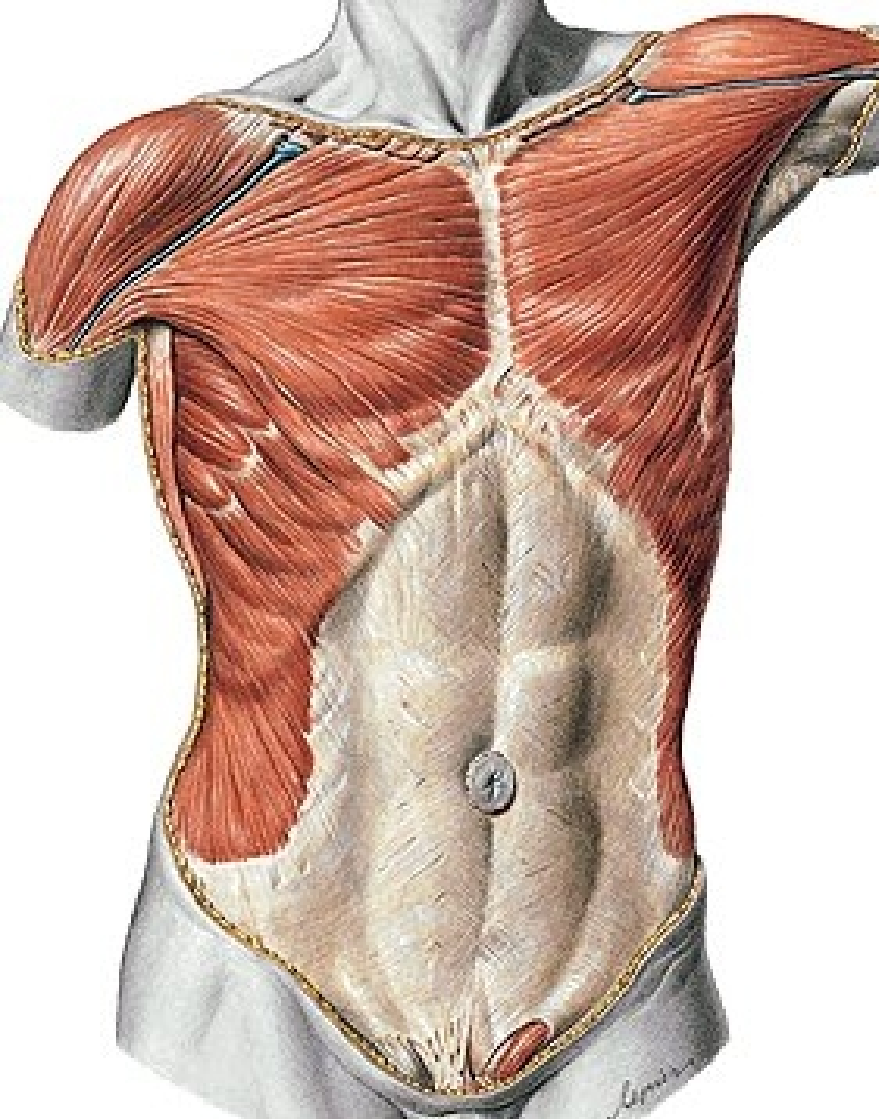
fascia lata femoris

Muscles of the abdomen

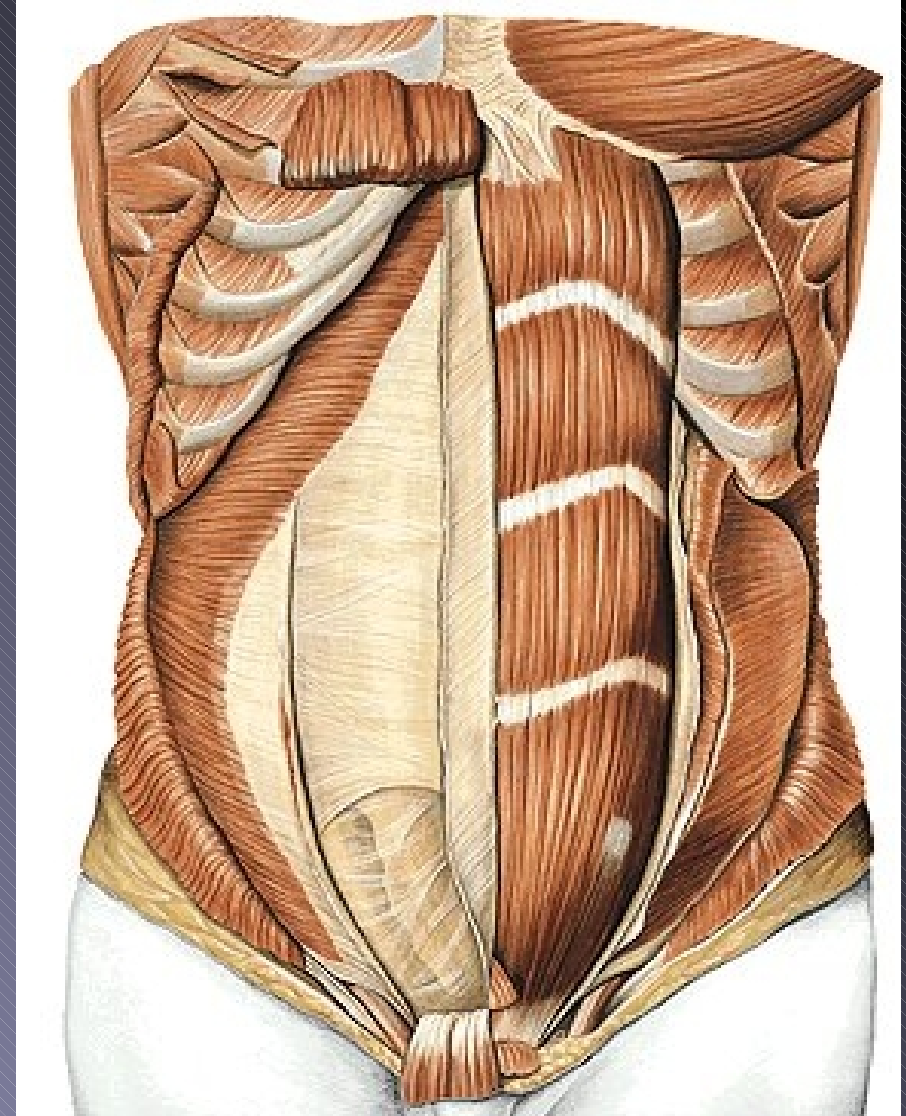
ventral – m. rectus abdominis,
m. pyramidalis

lateral – m. obliquus abdominis
externus et internus,
m. transversus abdominis

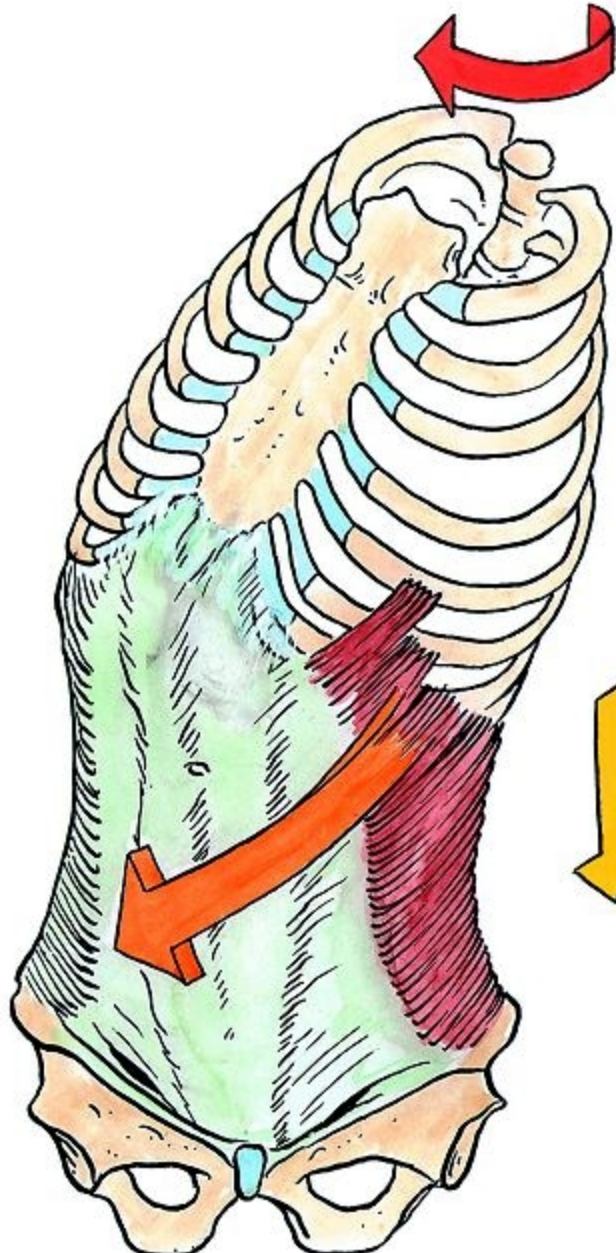
dorsal – m. quadratus lumborum



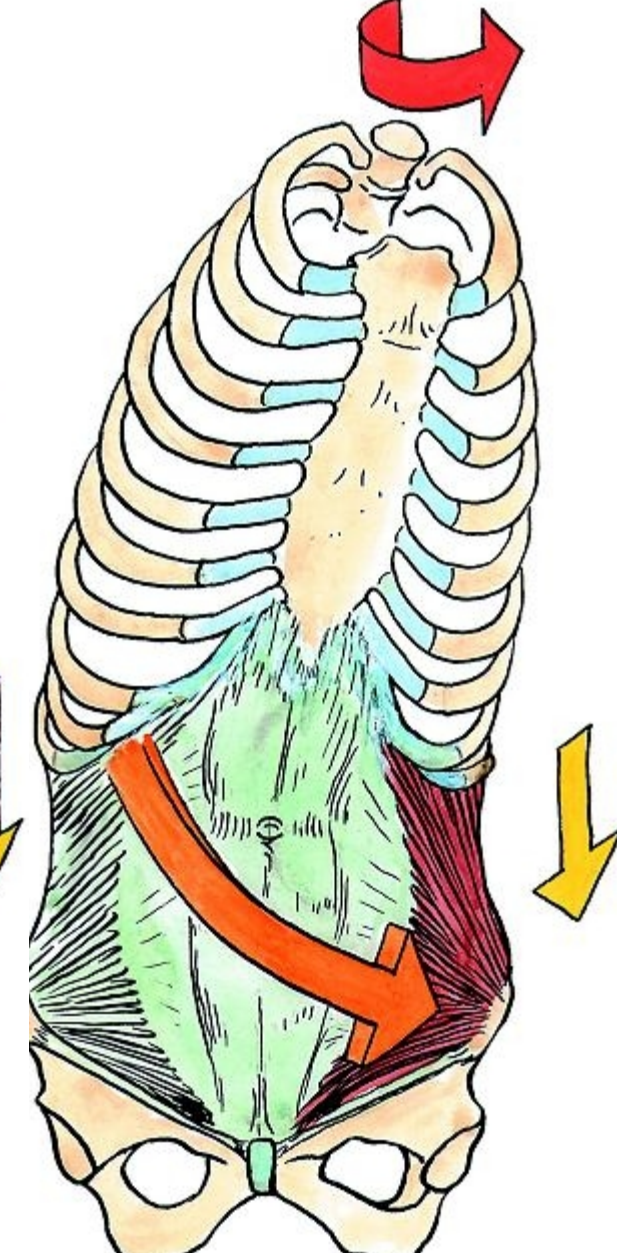
**m. rectus abdominis, vagina mm. recti abdominis
m. obliquus abdominis ext.**



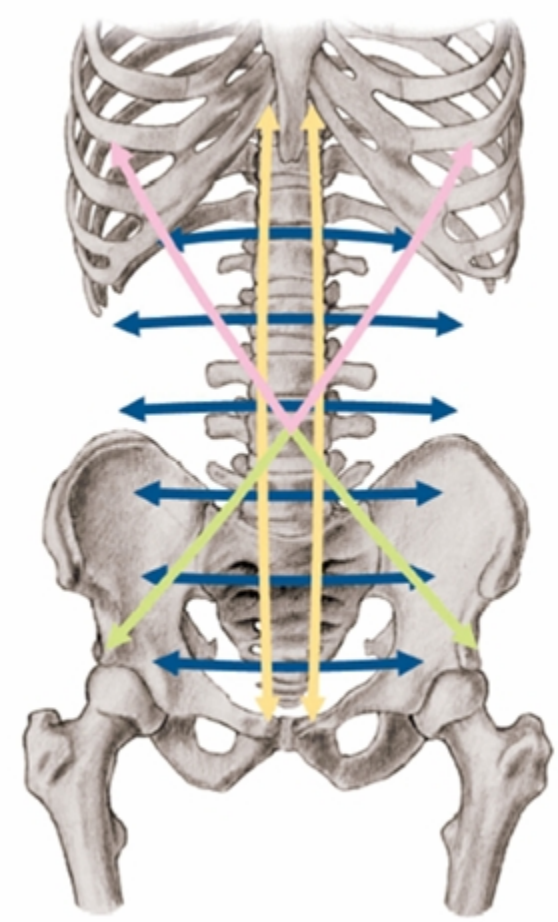
m. obliquus abdominis internus
m. transversus abdominis



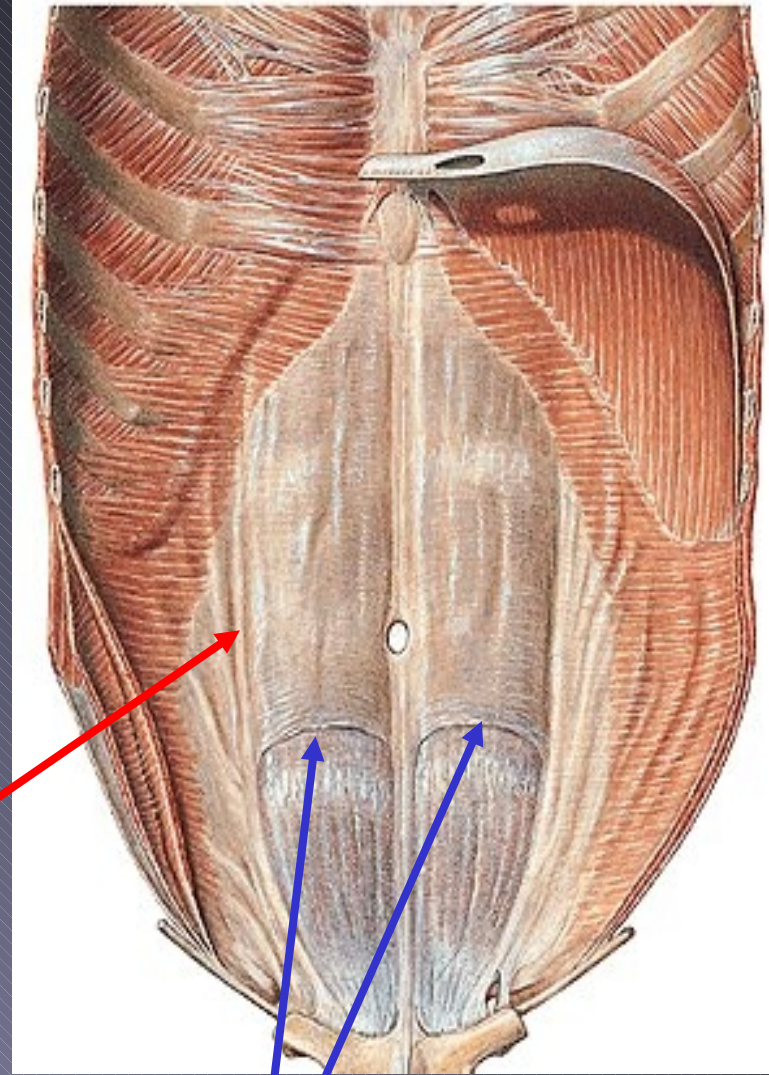
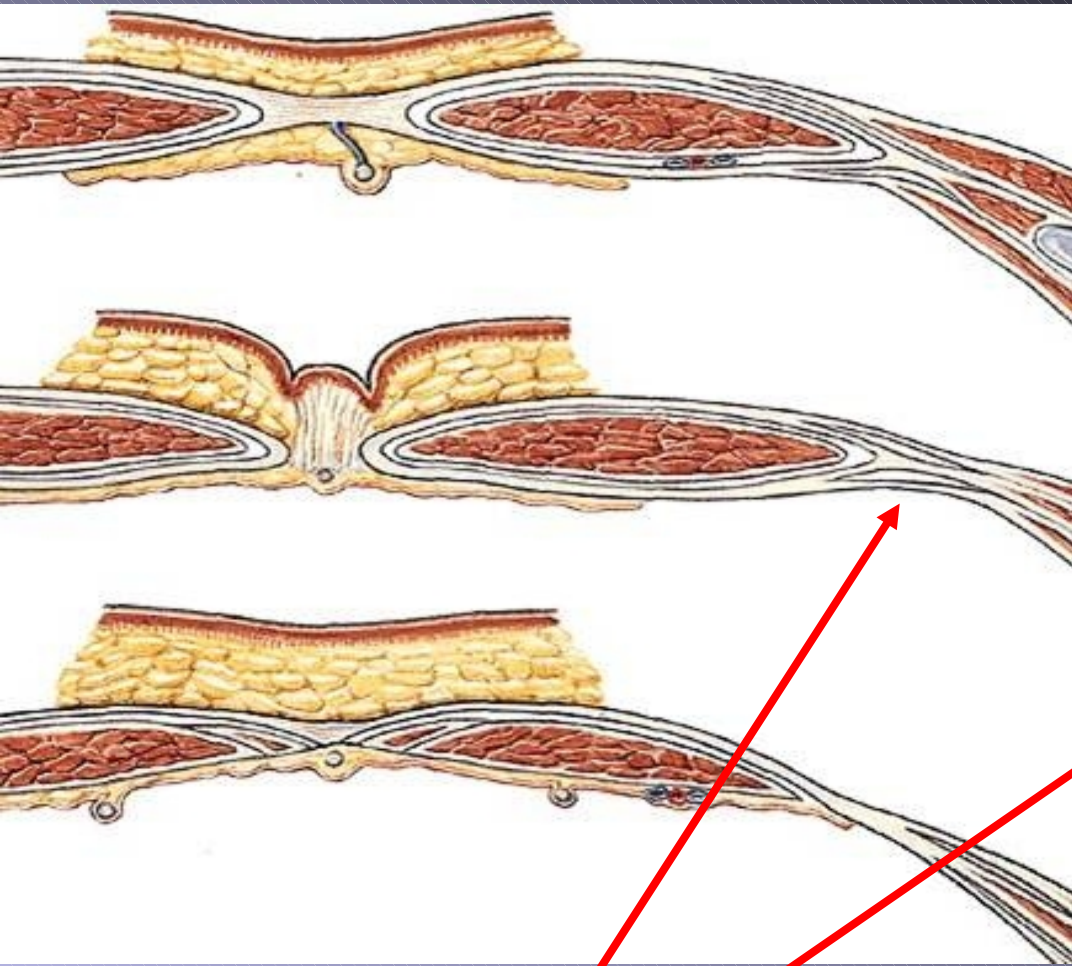
m. obliq. abd. externus



m. obliq. abd. internus



**Muscular corset
Countering the
back muscles**



Linea semilunaris

Linea arcuata (semicircularis)

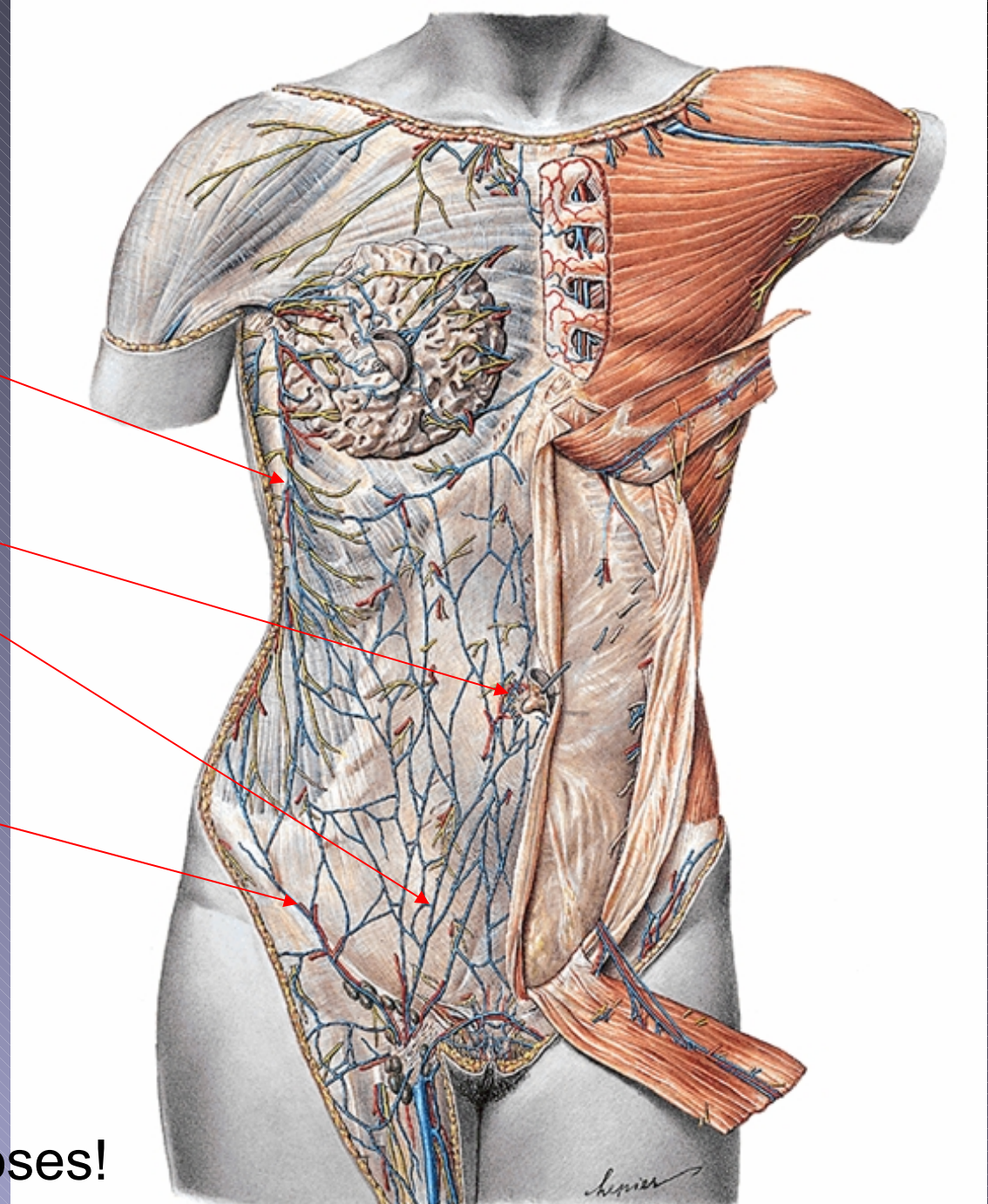
Vessels of the abdominal wall (superficial)

v. thoracoepigastrica

vv. paraumbilicales

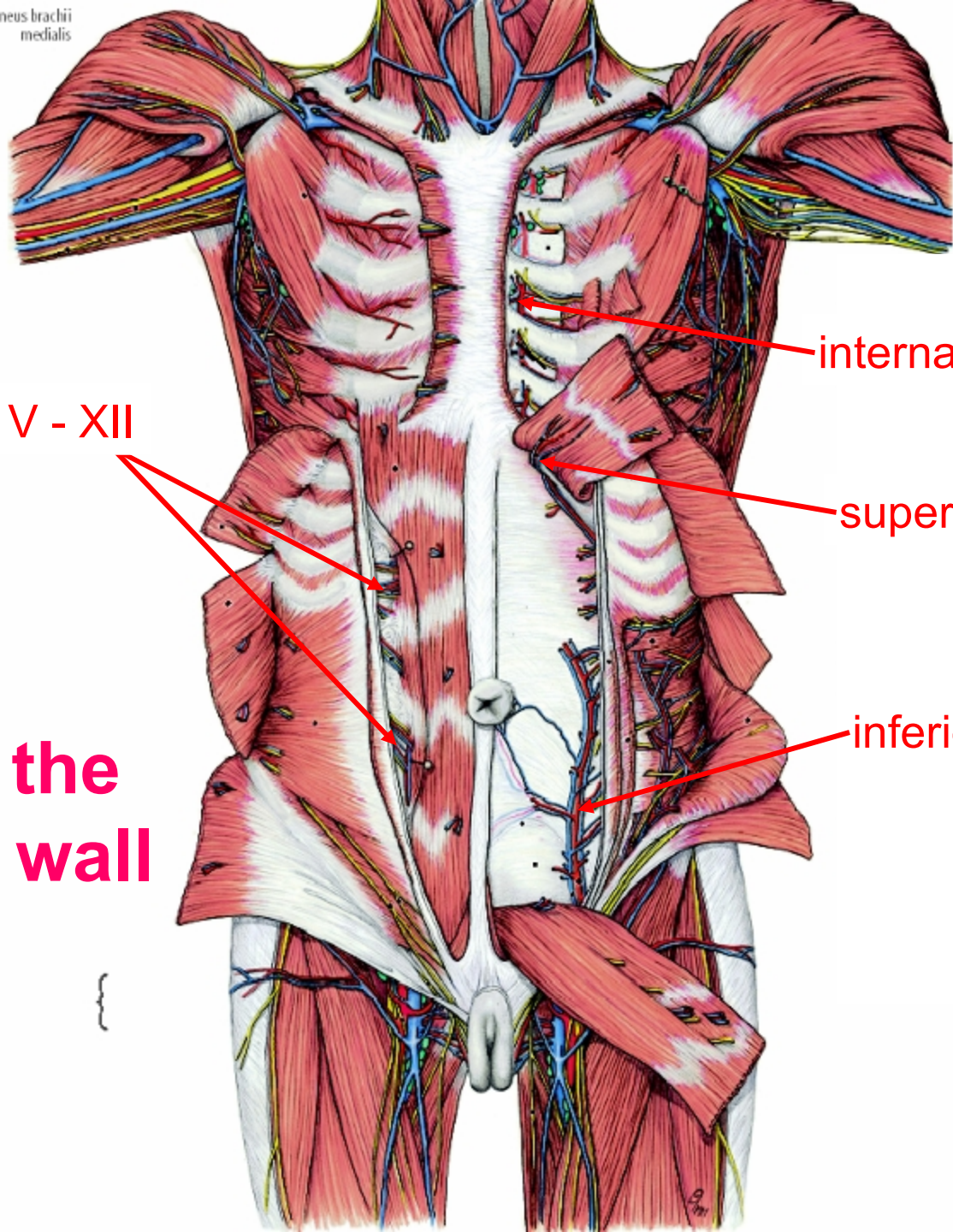
v. epigastrica superficialis

v. circumflexa ilium superficialis



=> cavo-caval anastomoses!

N. cutaneus trachii
medialis



internal thoracic a.

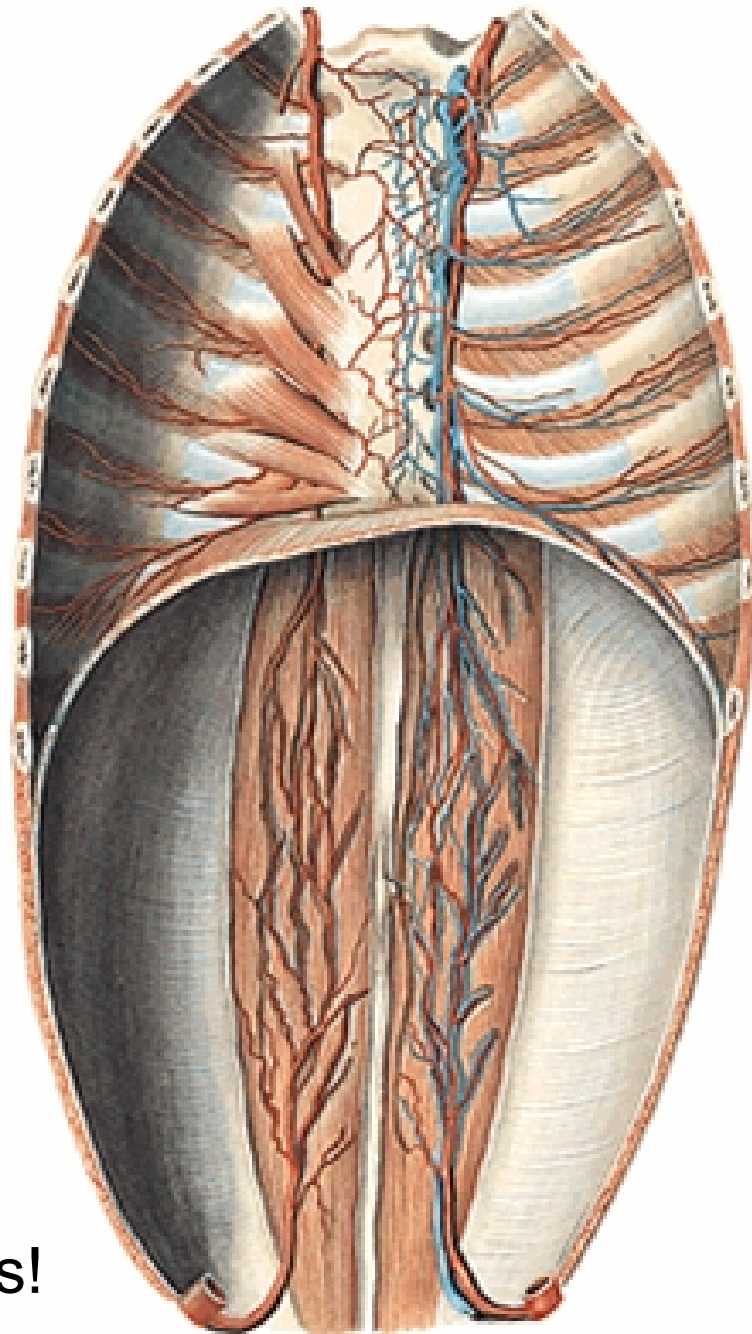
aa. intercostales V - XII

superior epigastric

inferior epigastric

**Vessels of the
abdominal wall
(deep)**

**Vessels of the
abdominal wall
(deep)
-inside view**



=> cavo-caval anastomoses!

Innervation:

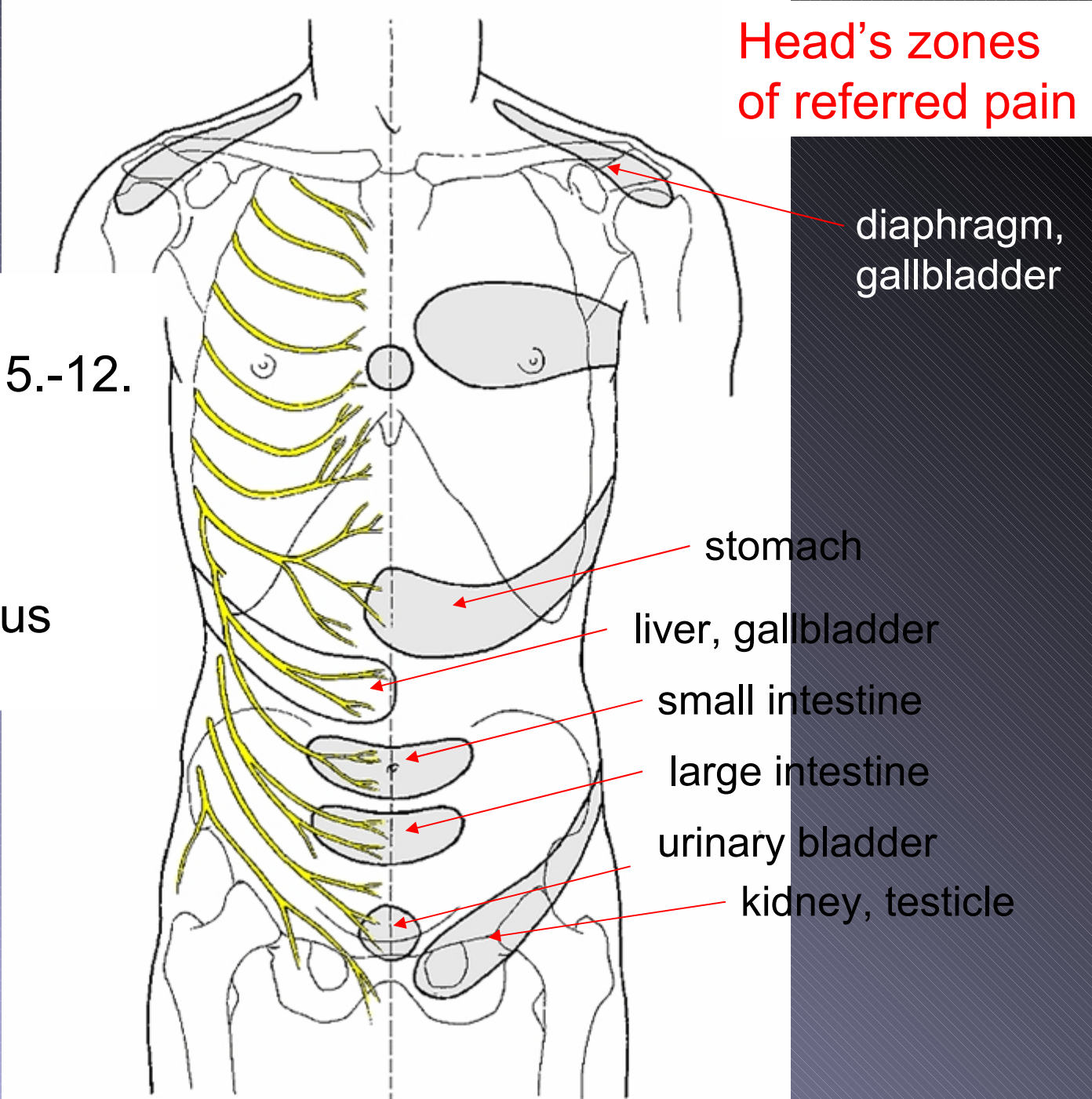
nn. intercostales 5.-12.

pl. lumbalis:

n. subcostalis

n. iliohypogastricus

n. ilioinguinalis



**Head's zones
of referred pain**

diaphragm,
gallbladder

stomach

liver, gallbladder

small intestine

large intestine

urinary bladder

kidney, testicle

Surgical approaches to the abdominal cavity

Midline laparotomy

- superior

- inferior

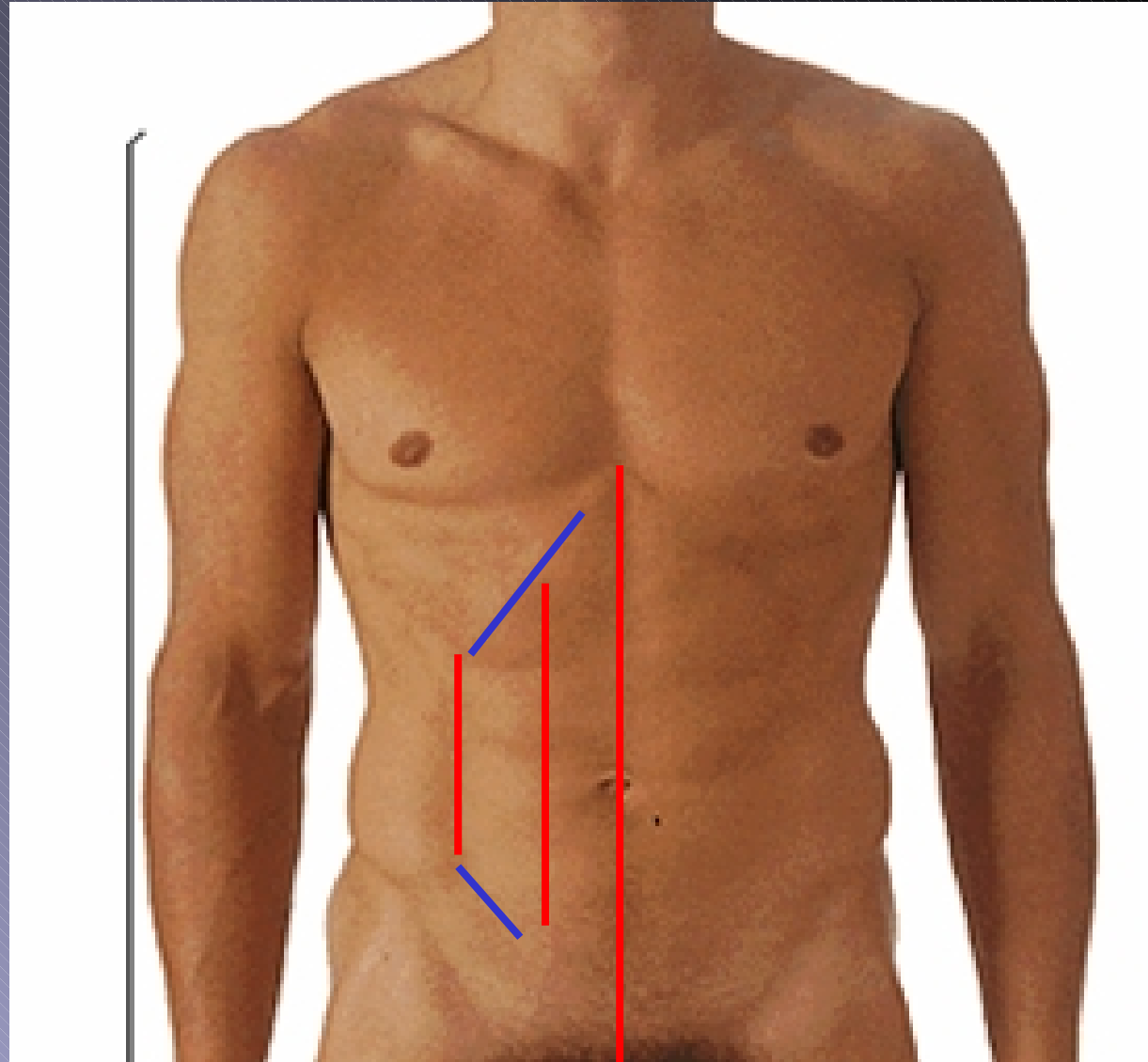
Transrectal approach

Pararectal approach

Alternating approach

Sprengel-Mc Burney

Subcostal approach





Paracentesis

Puncture & Drainage

Beware of topography
and possible injury to the
pleural cavity (recesses)

Laparoscopy

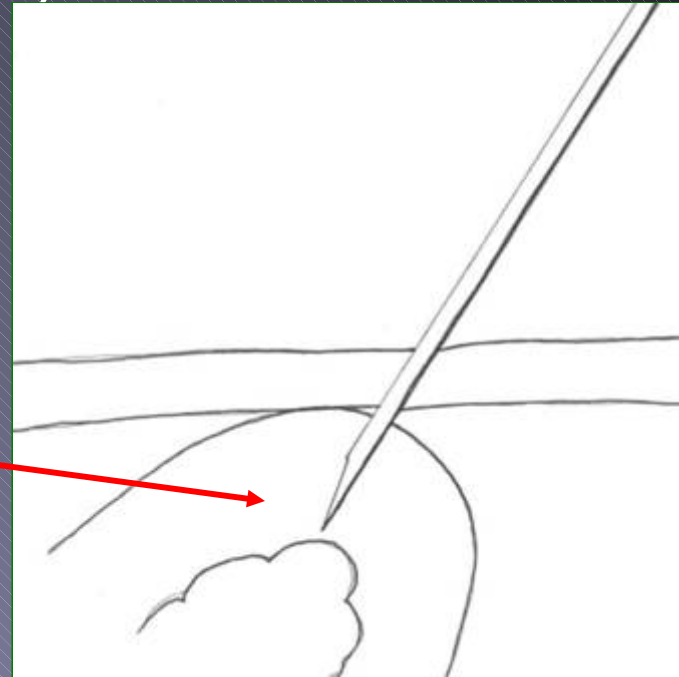
Needle puncture – Veressi needle
applied kapnoperitoneum - CO₂
to create some “wobble room”,
air is not used (danger of embolism)

Possible complications:

Injury to epigastic vessels,
or intestinal loop,

Rare but serious:

- aortic puncture (possibly lethal)





Obr. 3. Laparoskopická věž firmy Wolf



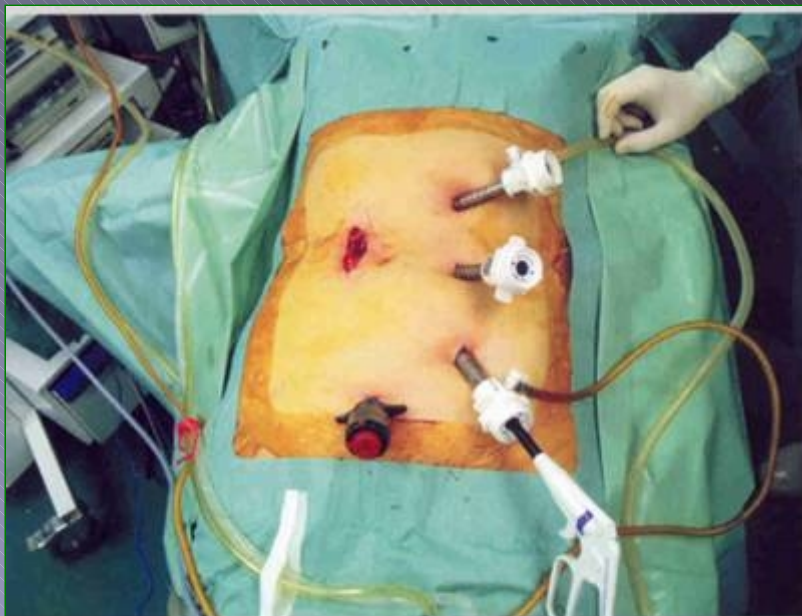
Obr. 4. Laparoskopická věž firmy Olympus



Detail branži laparoskopického jehelce firmy Ethicon



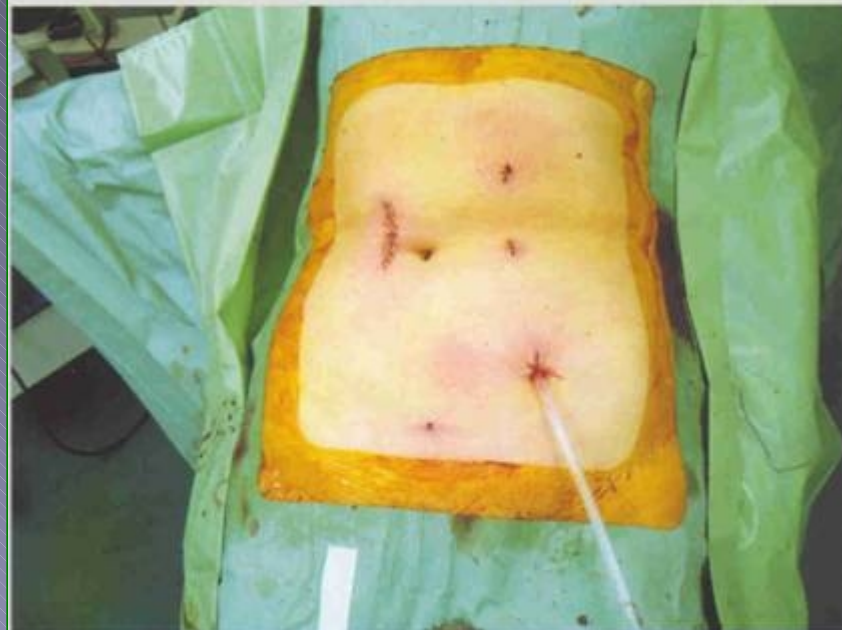
Equipment for laparoscopic surgery

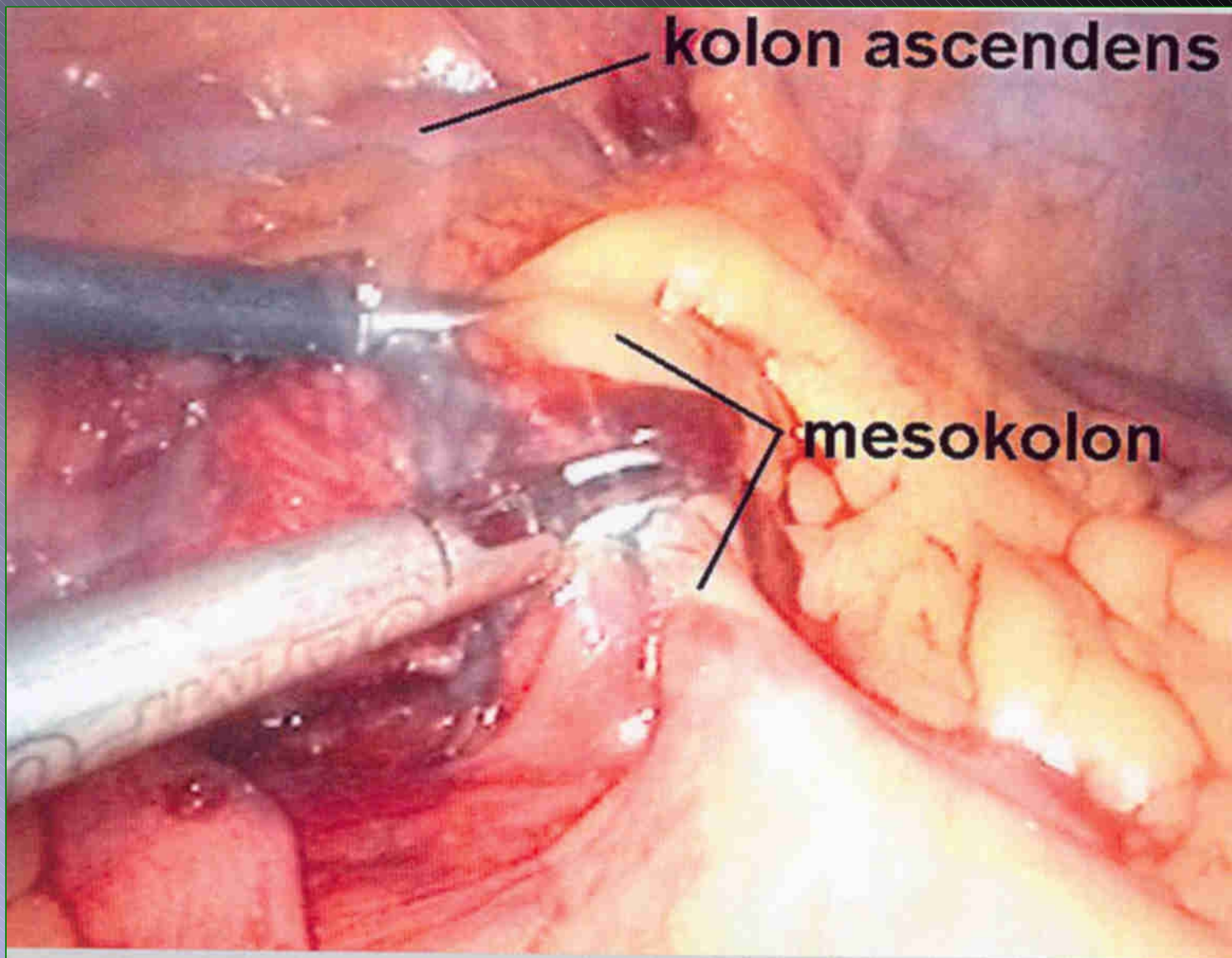


Obr. 42. Minilaparotomie



Obr. 45. Ileo-tranzverzoanastomóza





Obr. 40. Protínání mezokola kolon ascendens harmonickým skalpelem

Advantages of laparoscopy

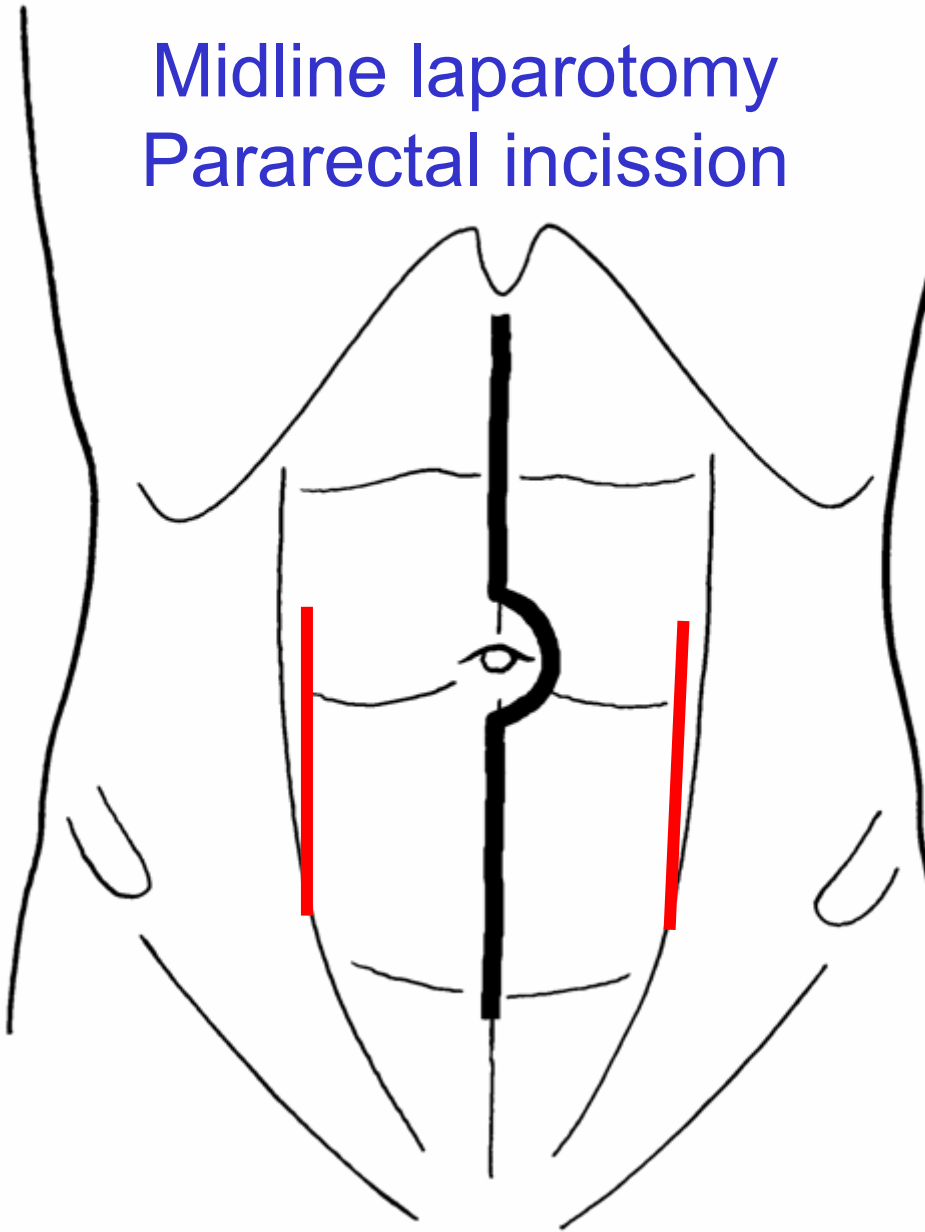
Early –

less pain, faster healing, collaboration, rehabilitation

Long-term -

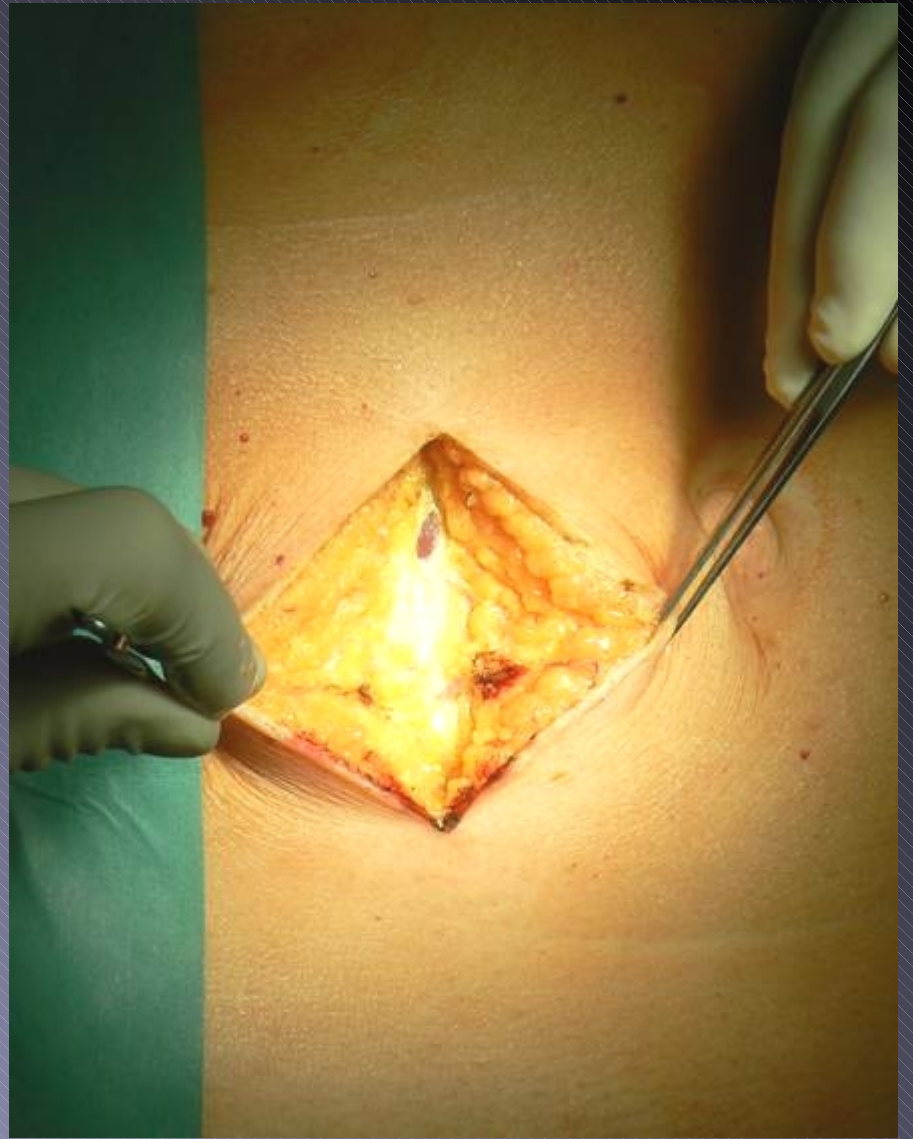
Preserves integrity of abdominal wall, less scarring, adhesions, hernias in scar

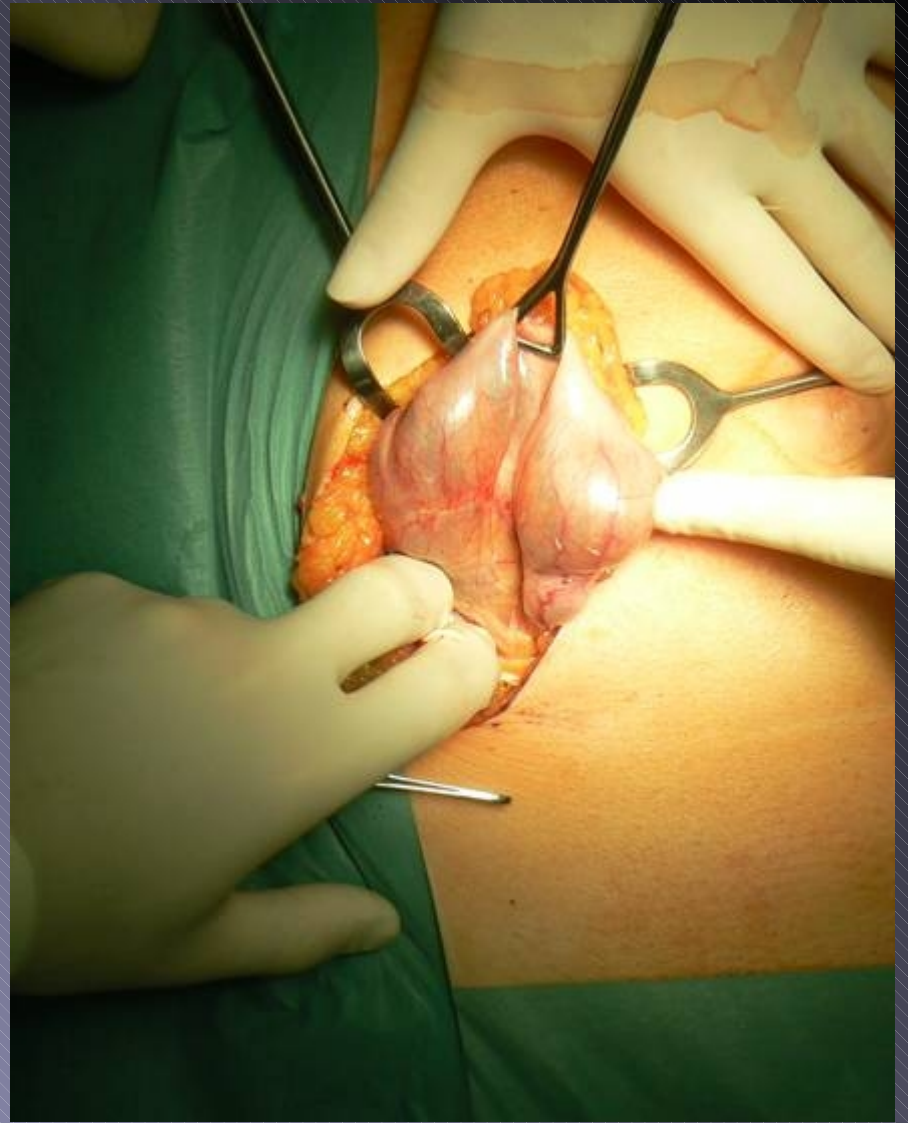
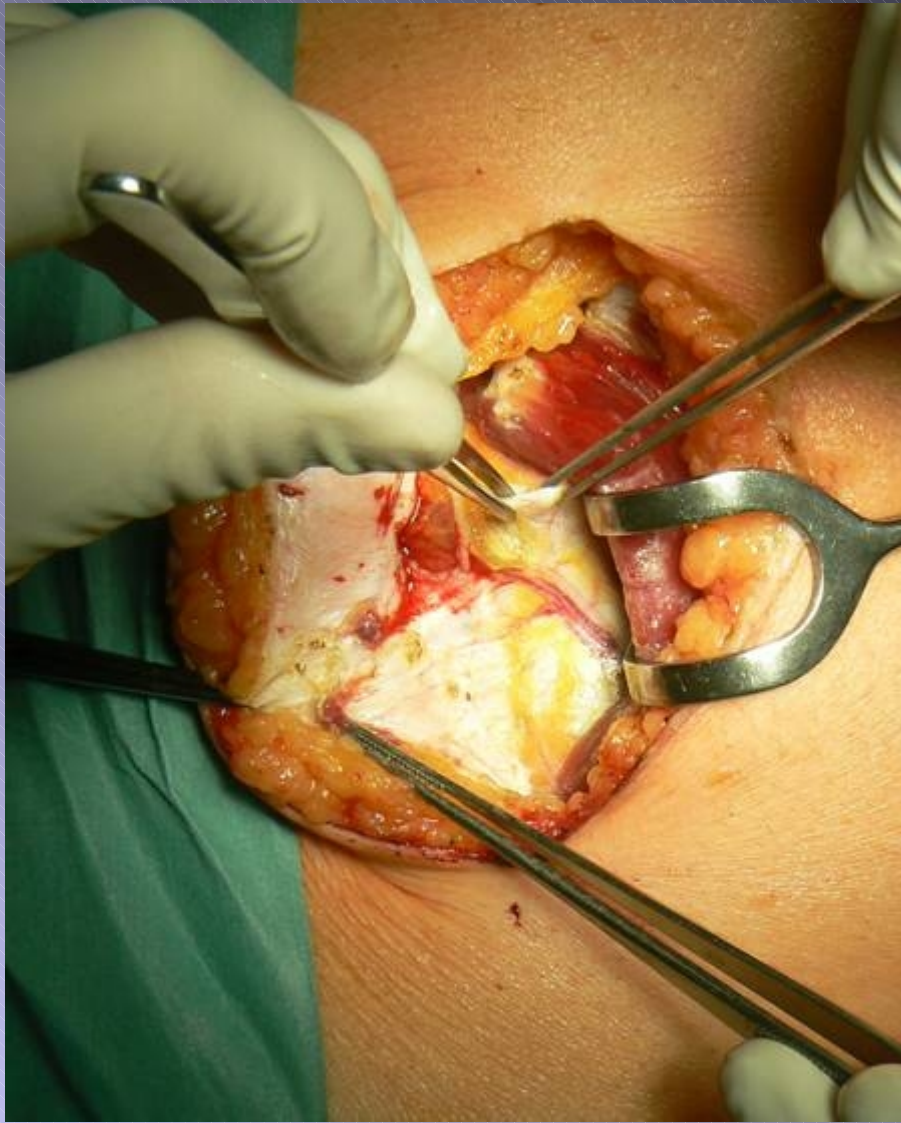
Midline laparotomy
Pararectal incision



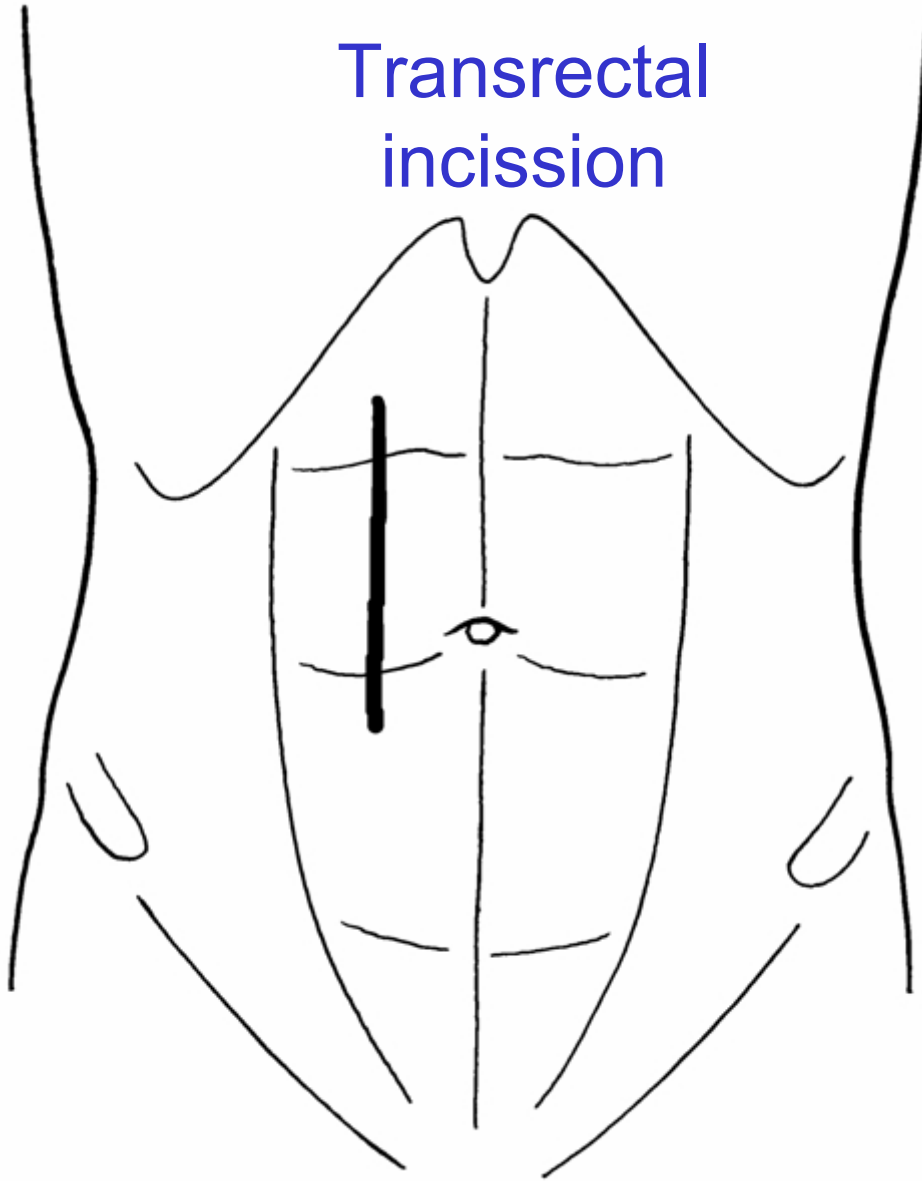
Pararectal incision: what are the pitfalls?



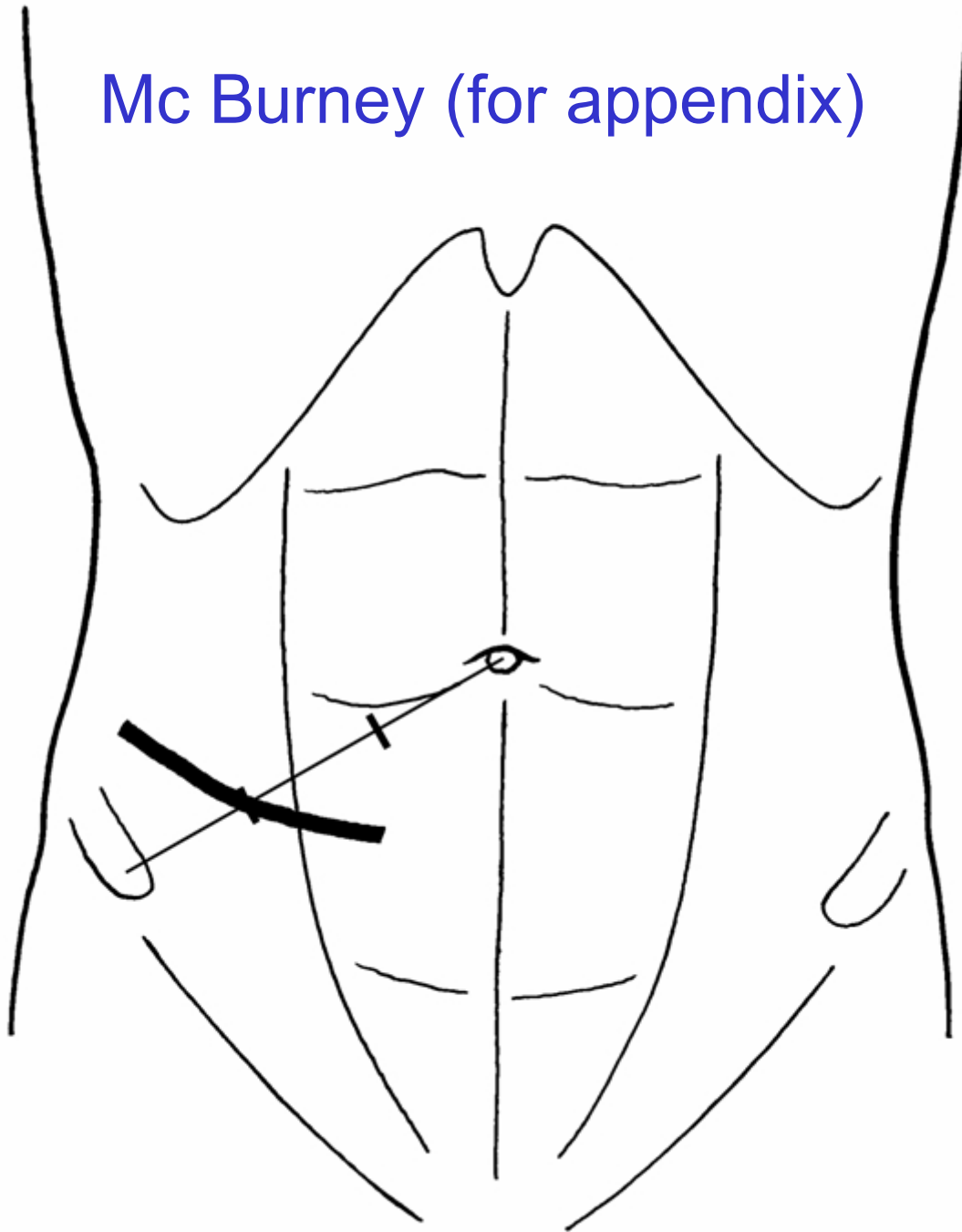




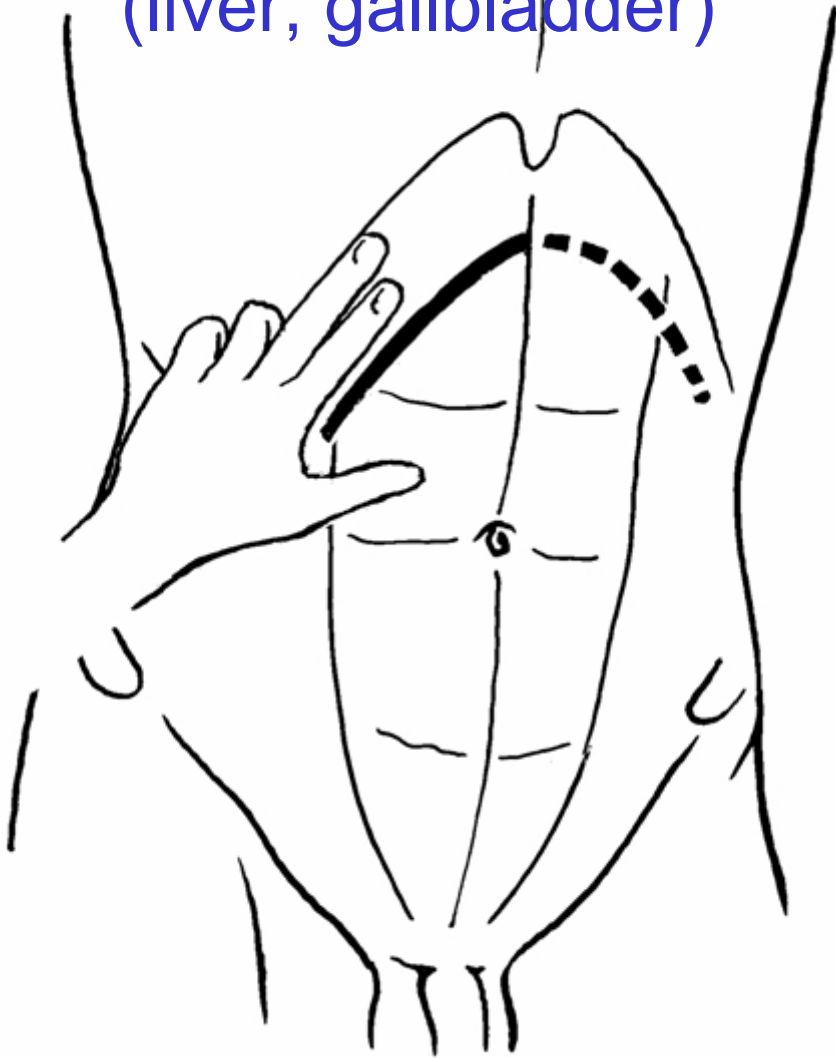
Transrectal incision



Mc Burney (for appendix)

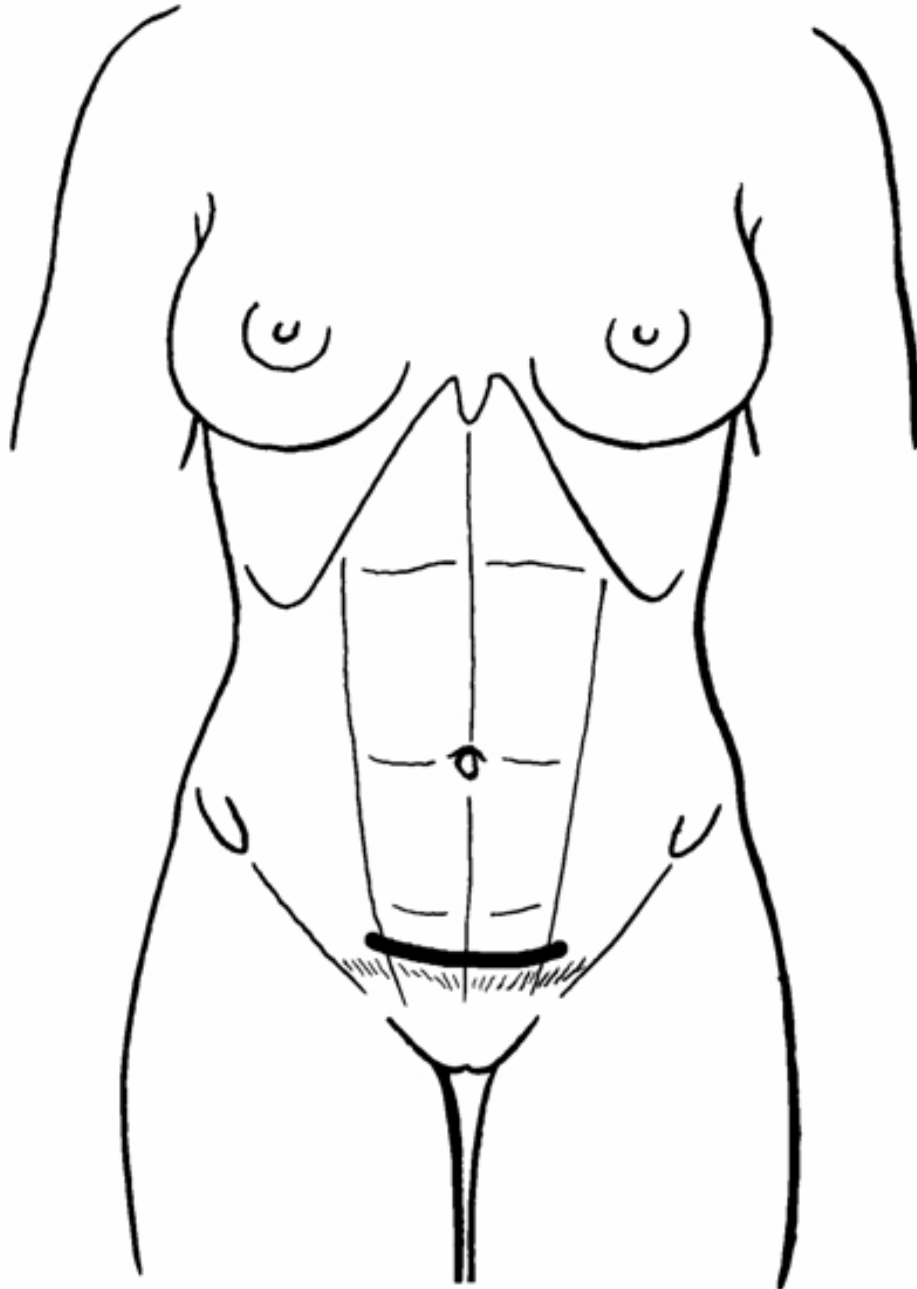


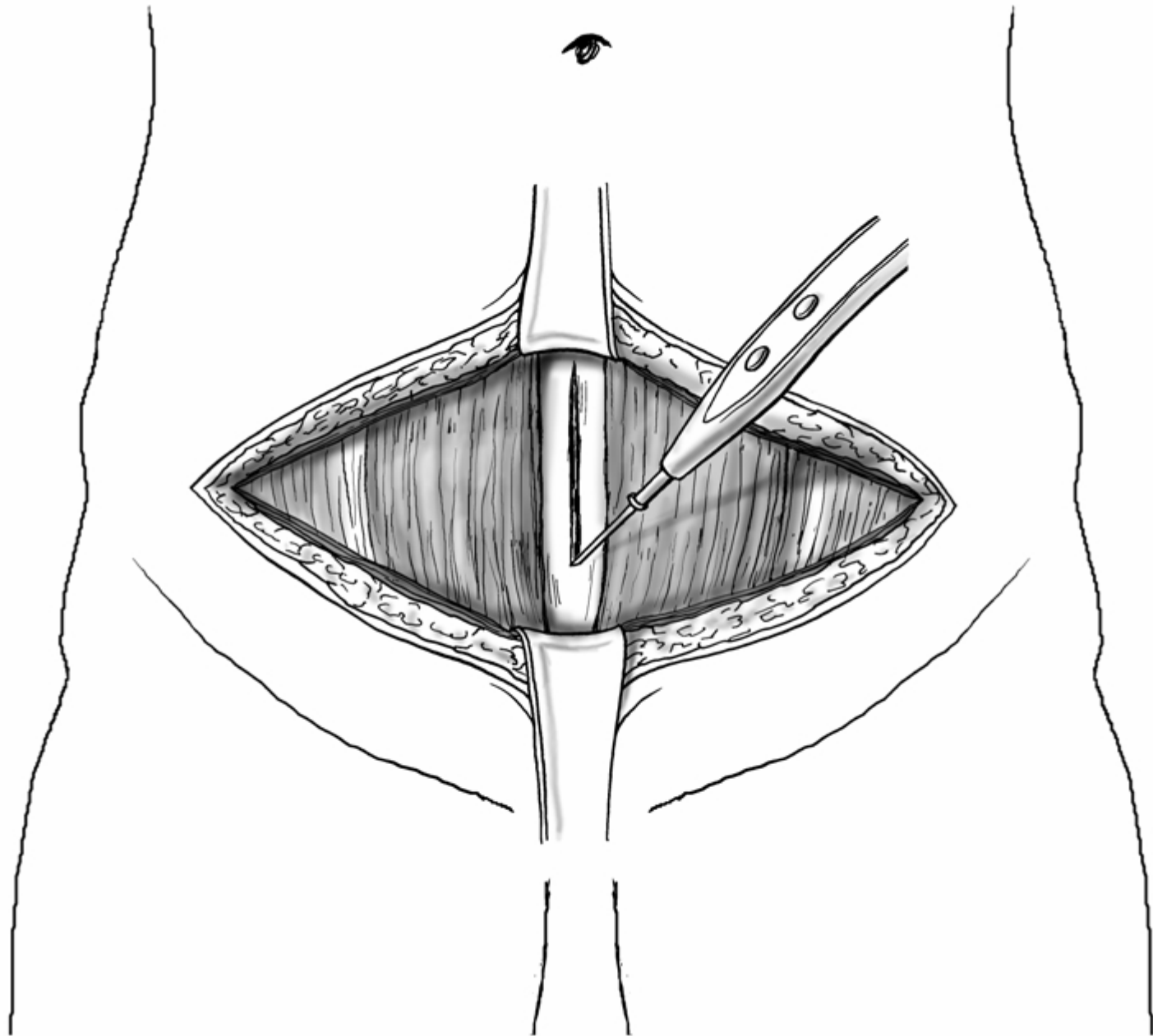
Subcostal incision (liver, gallbladder)



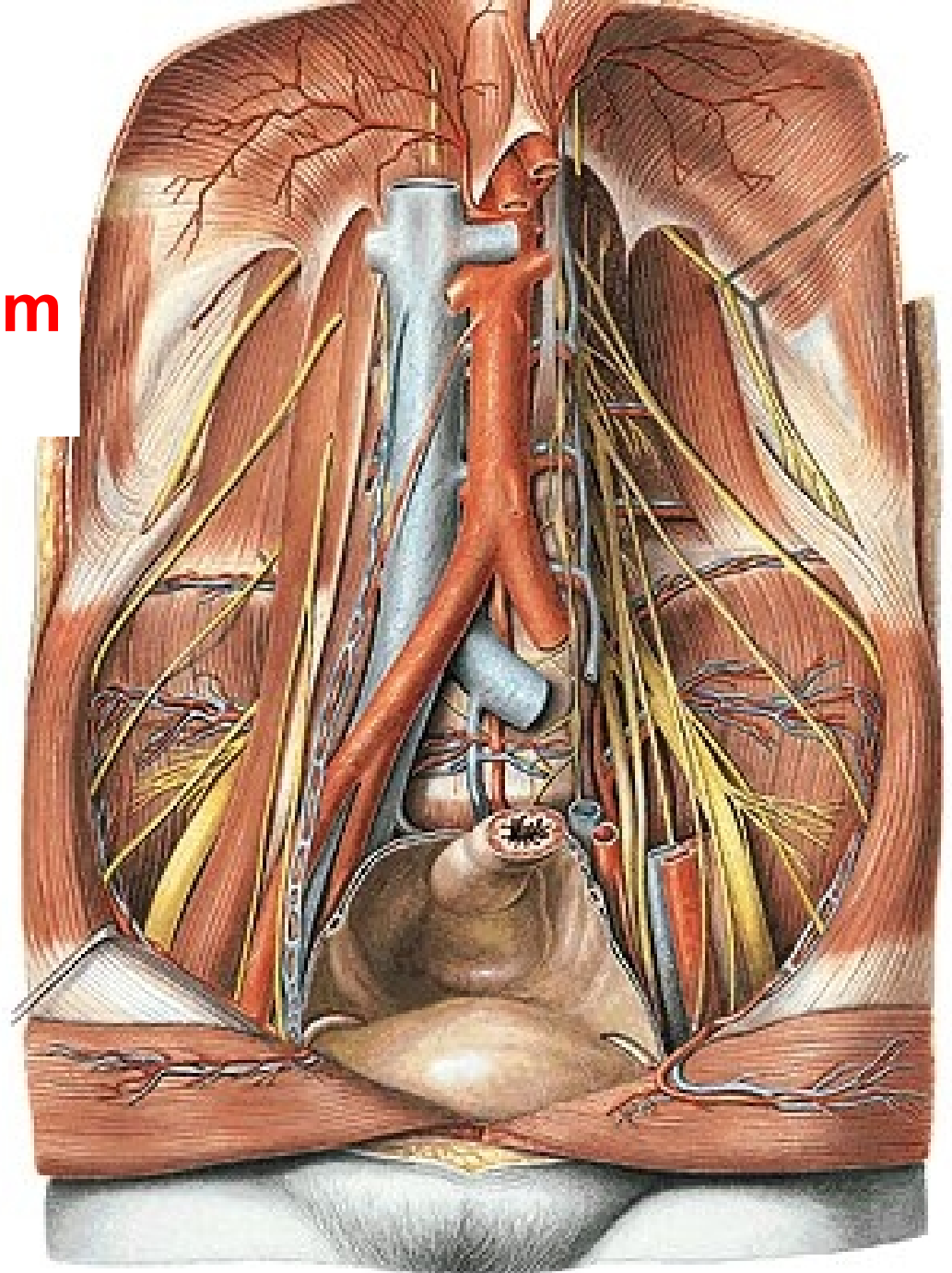
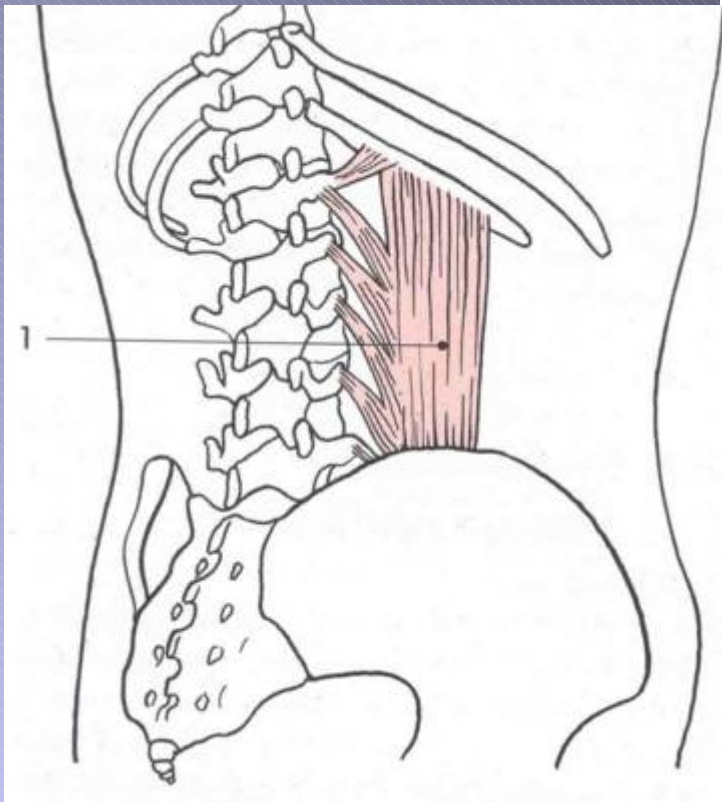


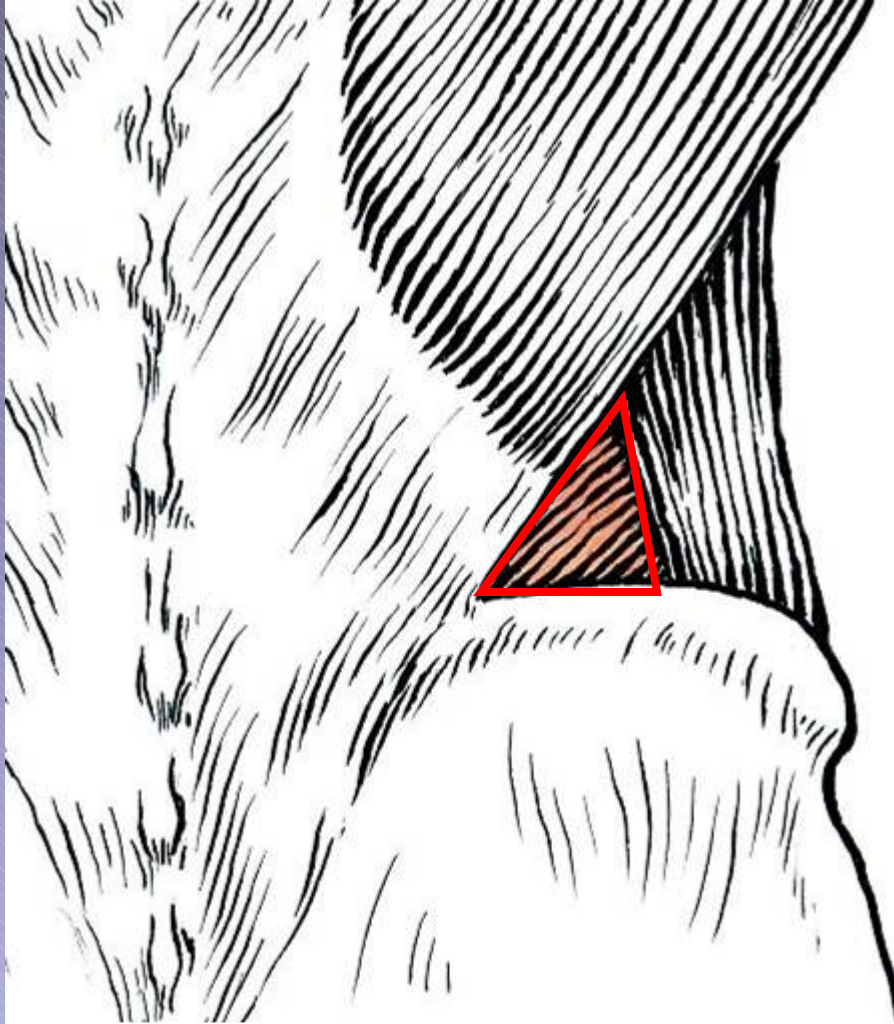
Pfanenstiel (bladder, Ceasarian)





M. quadratus lumborum





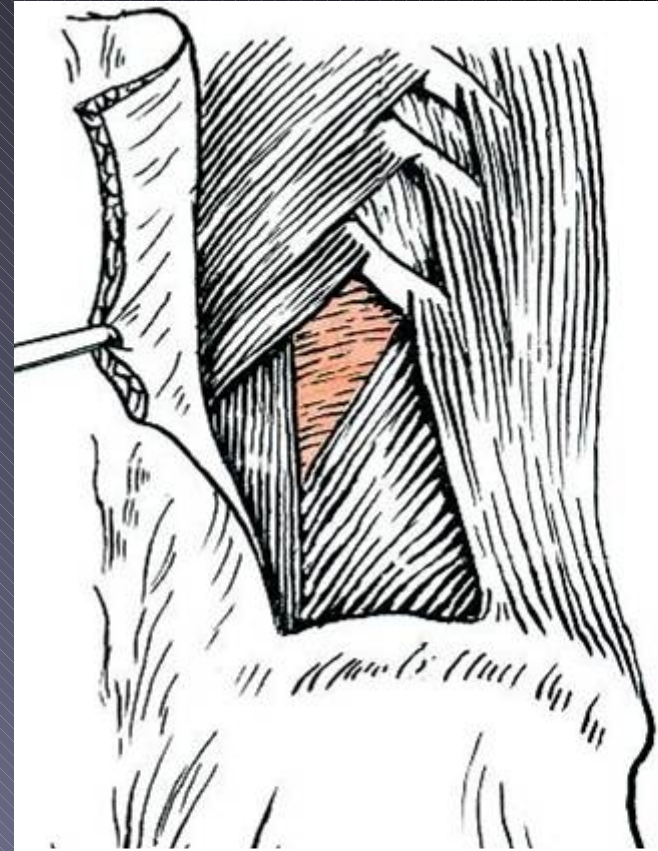
Trigonum lumbale (Petiti)

crista iliaca

m. obliquus externus abd.

m. latissimus dorsi

- hernias (rare)



Spatium tendineum

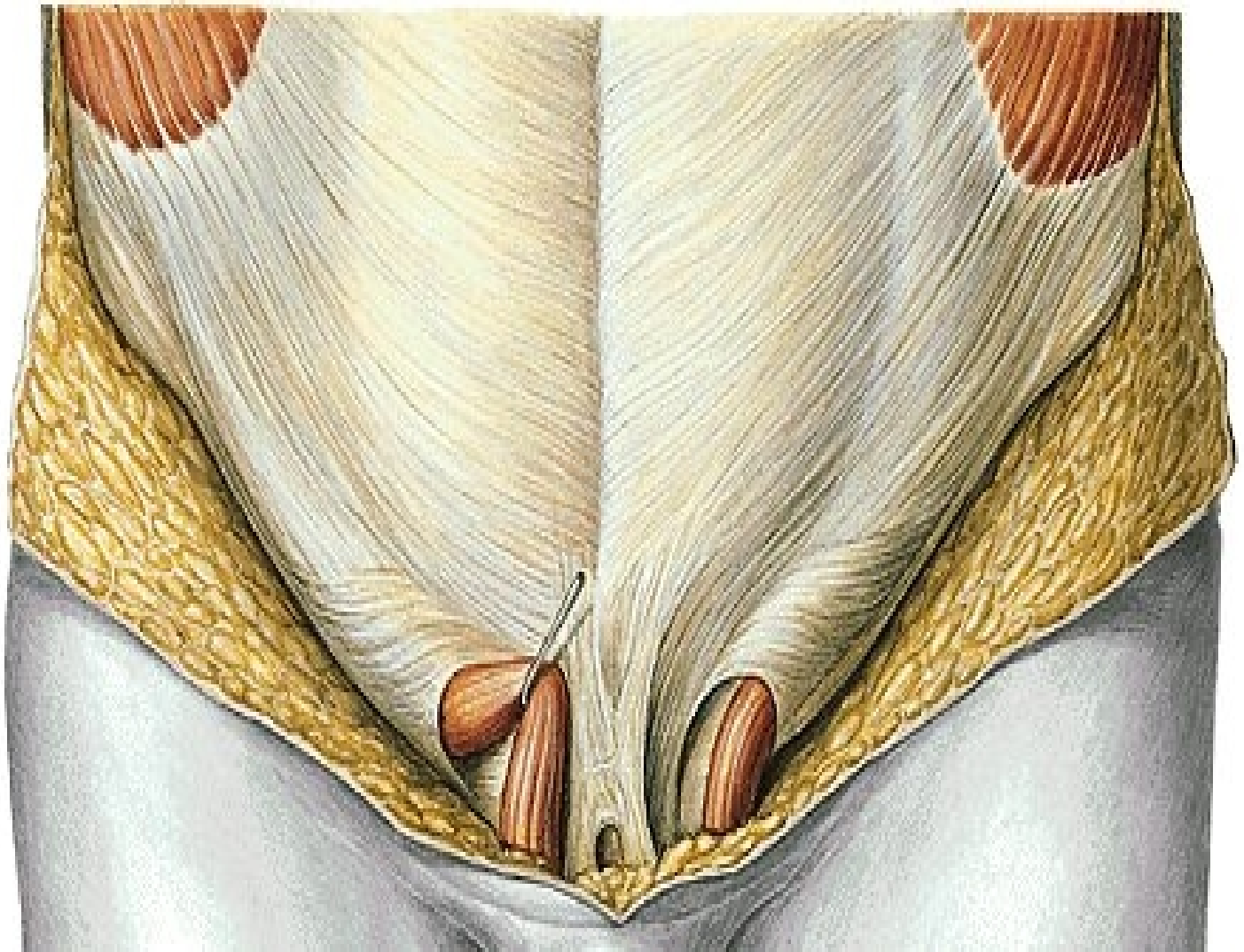
lumbale-tetragon Krausei

12th rib

m. serratus post. Inf.

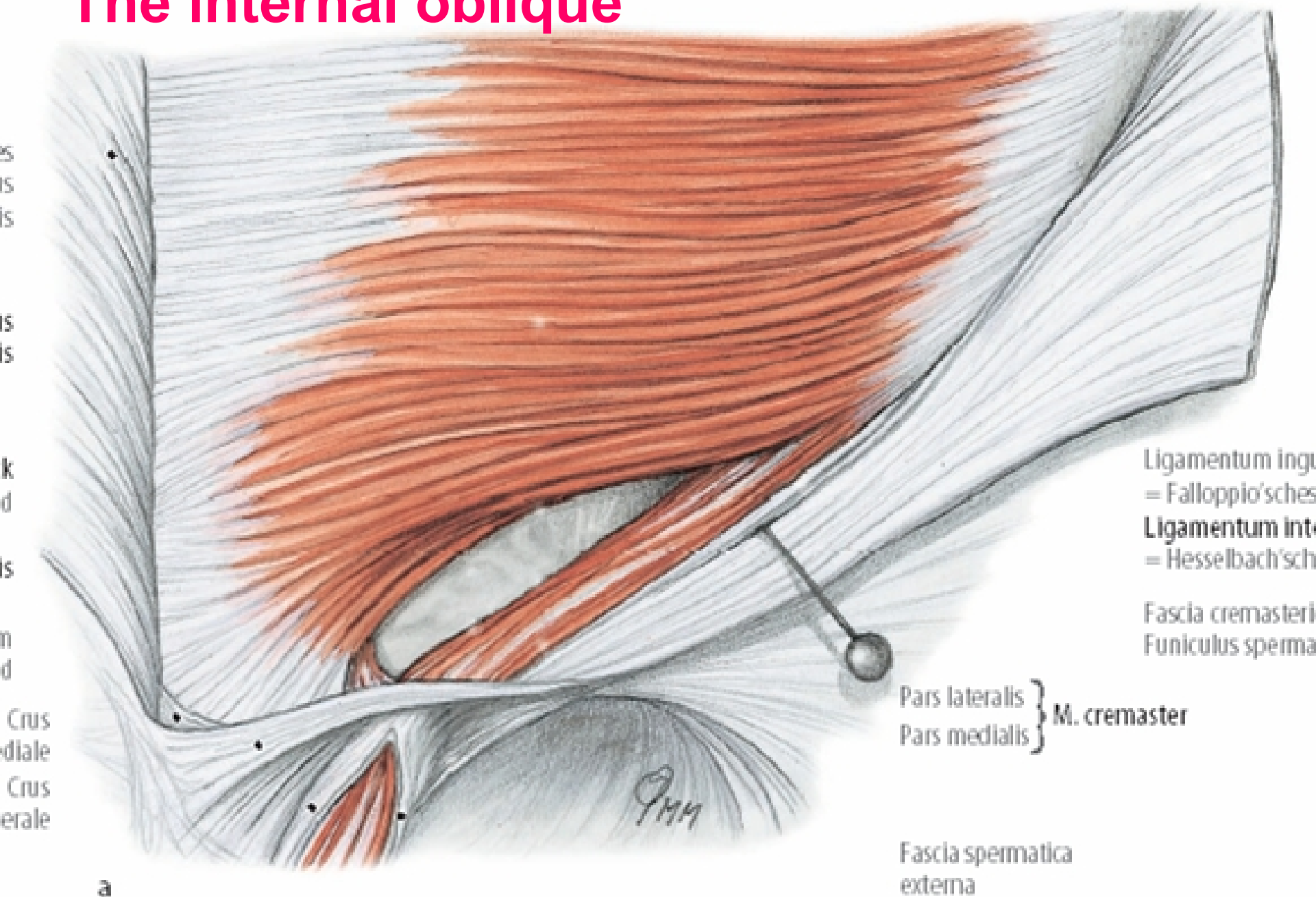
m. sacrospinalis

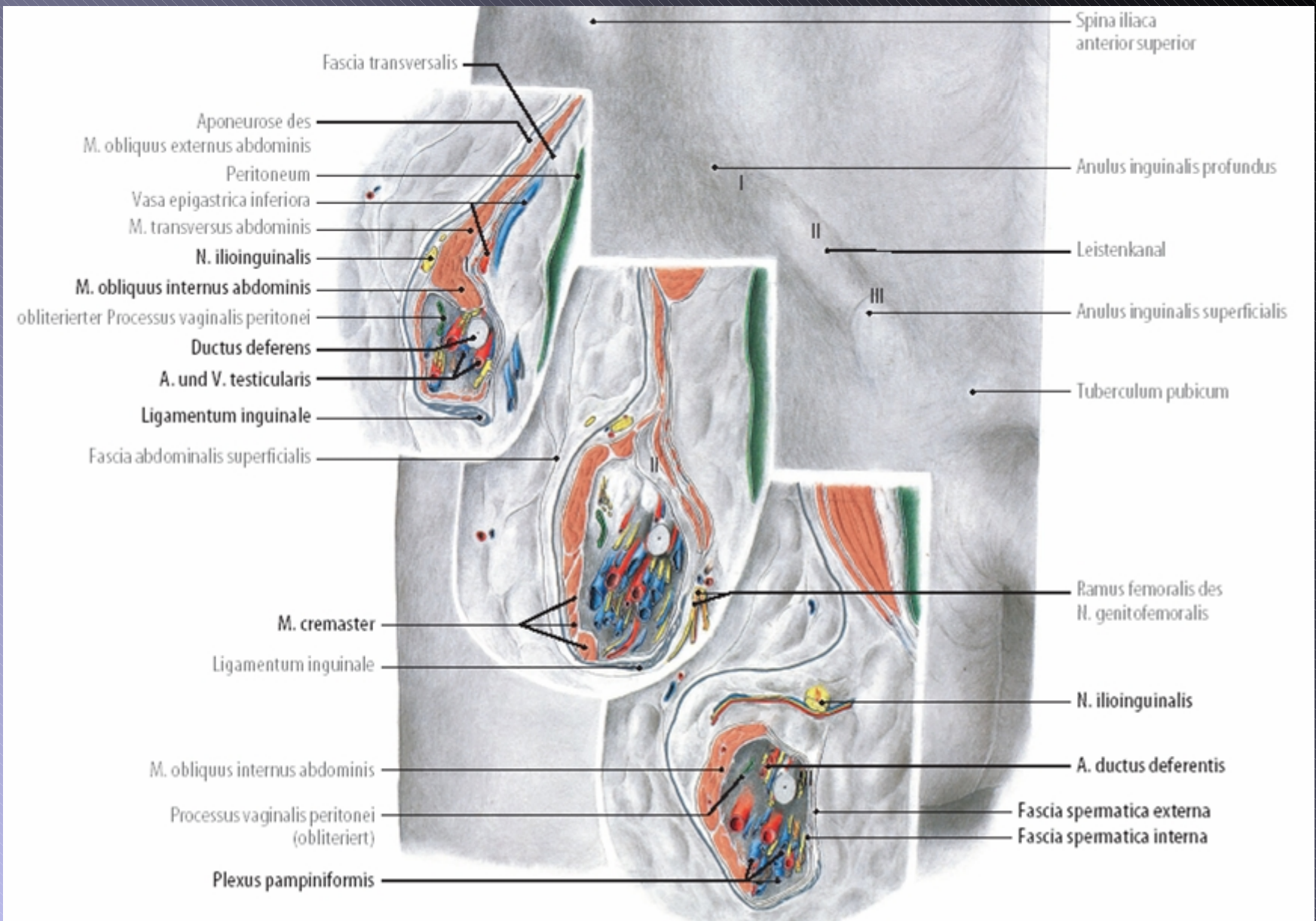
m. obliquus abd. internus



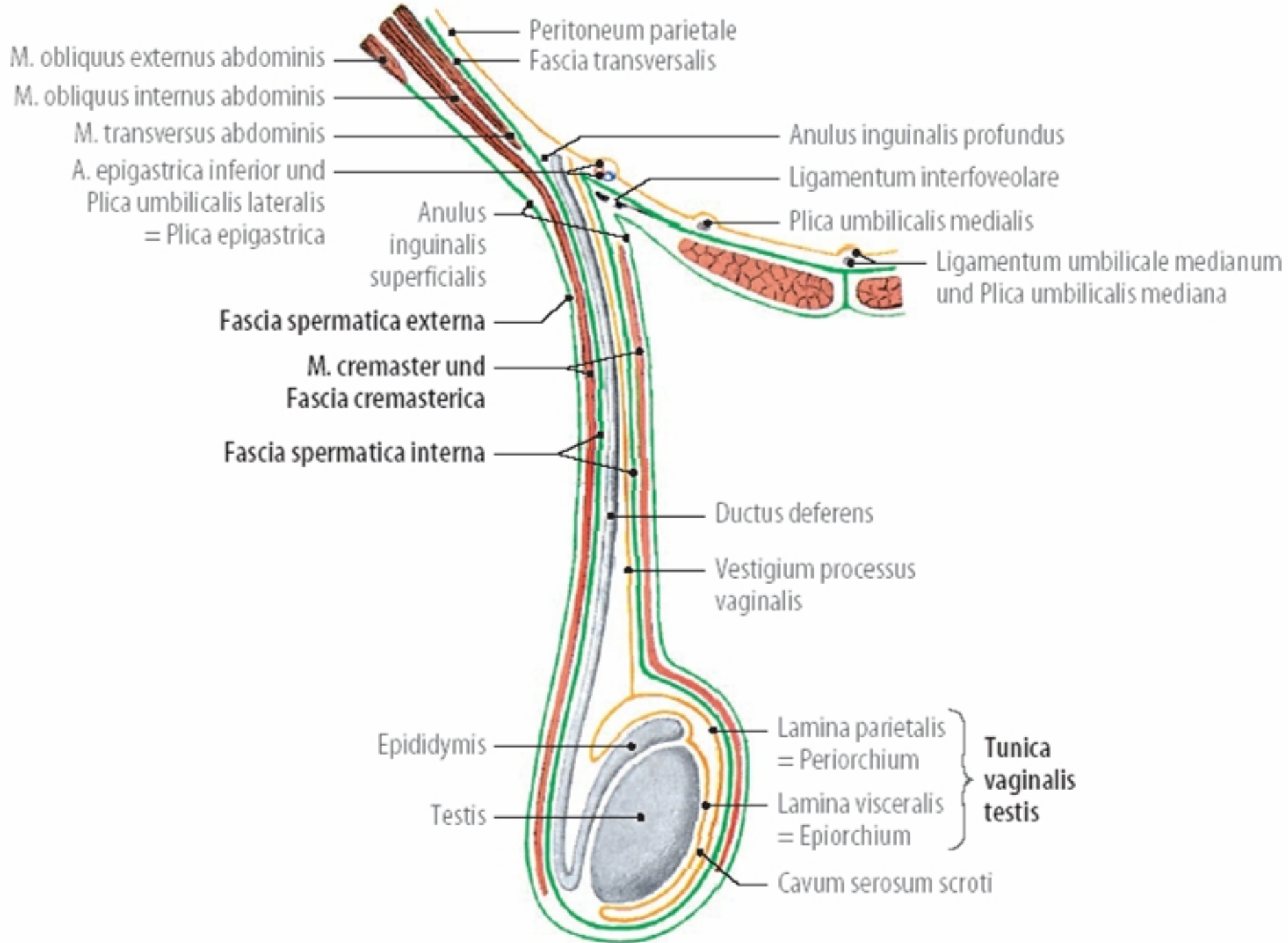
**The inguinal canal:
Aponeurosis of the external oblique muscle**

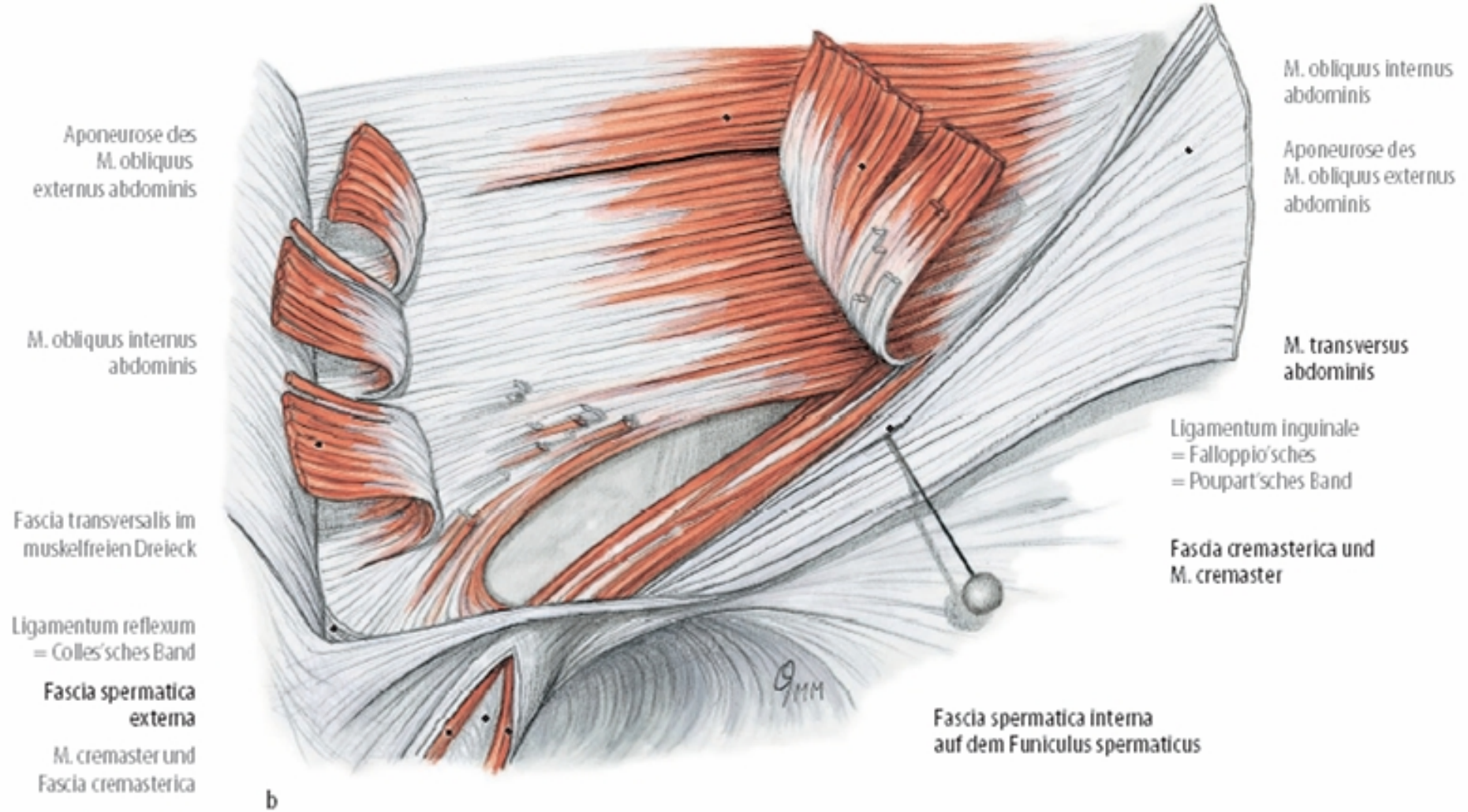
The internal oblique





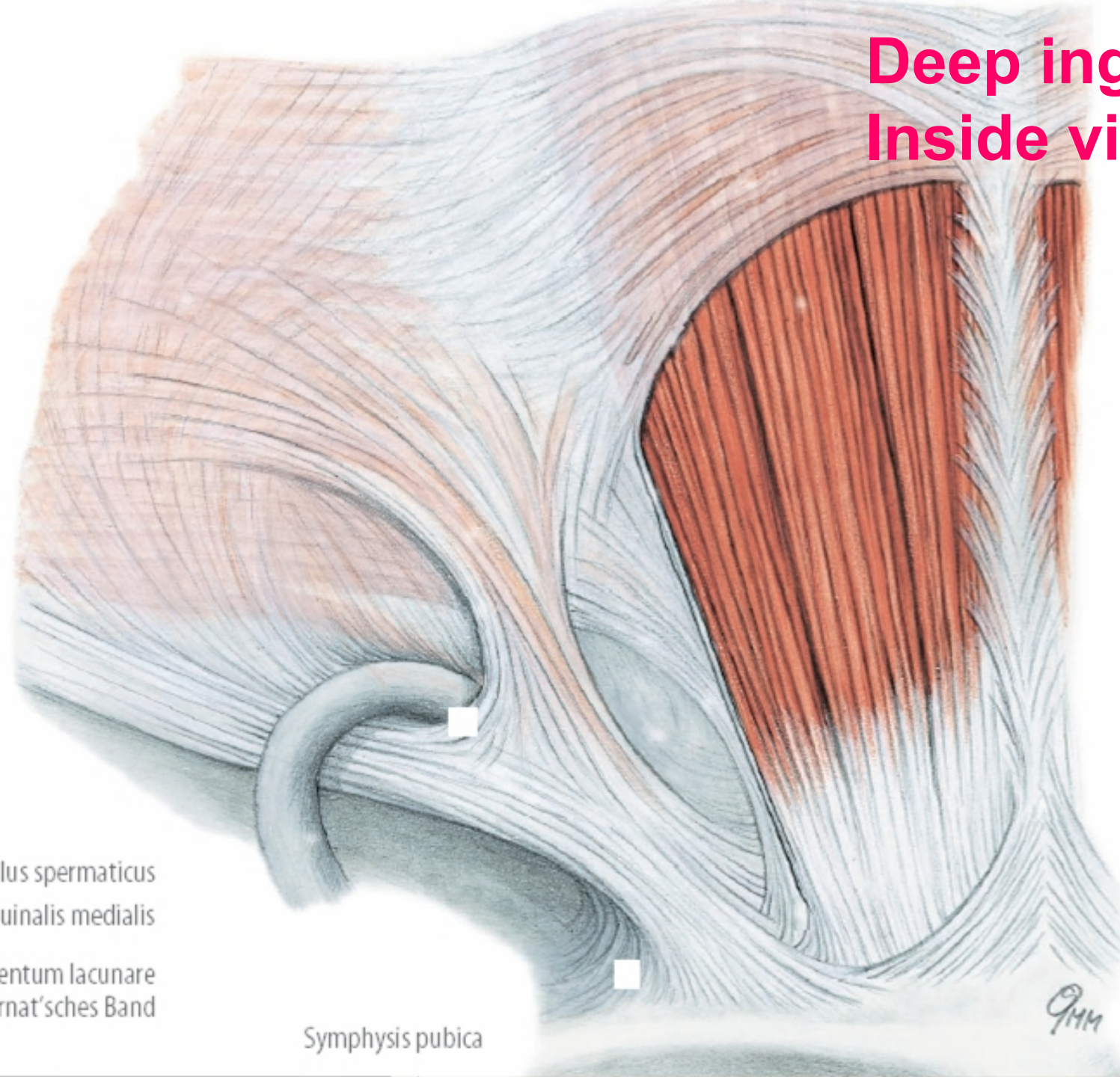
The inguinal canal - cross sections





The inguinal canal: Transversus abdominis muscle

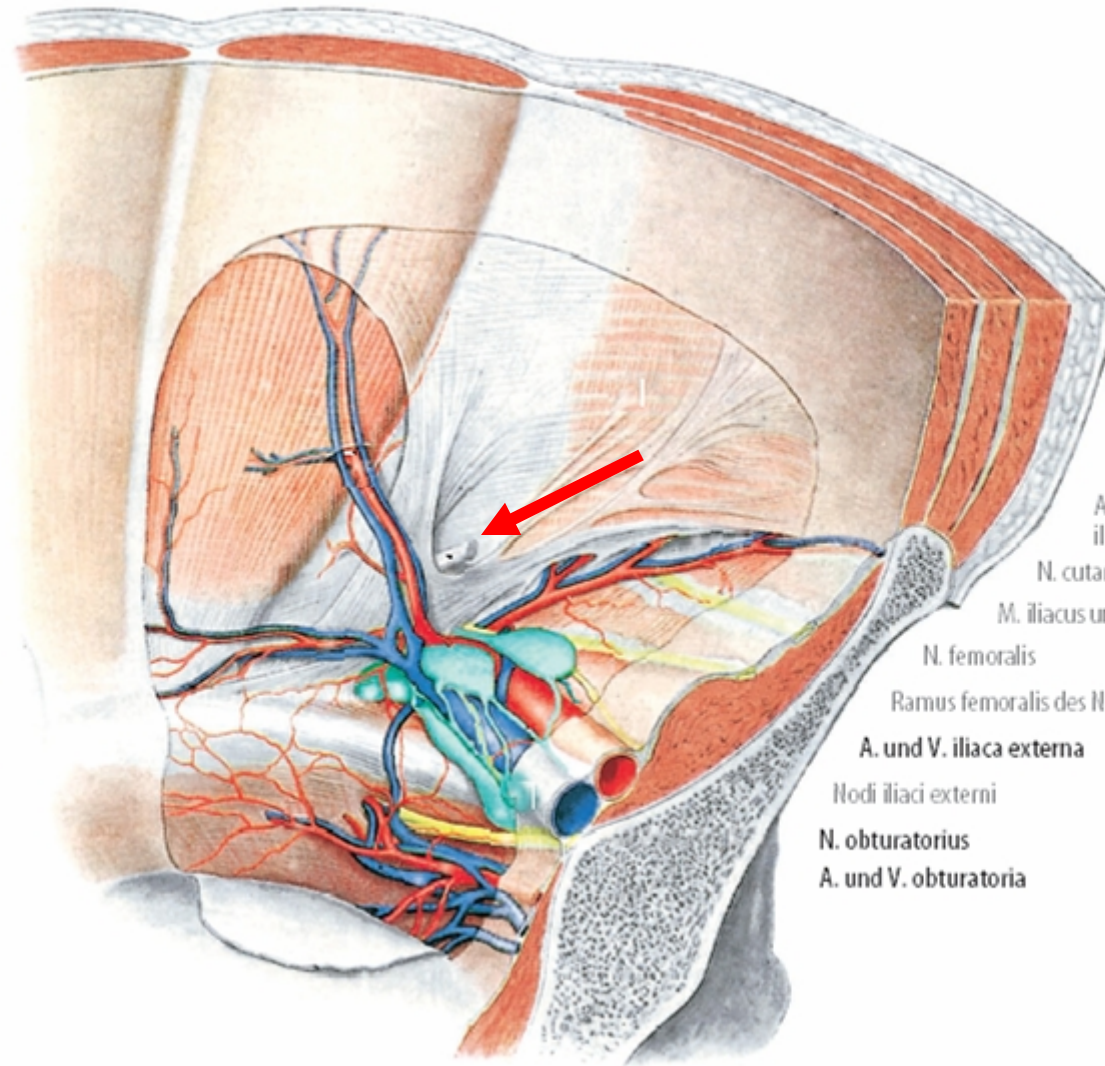
Deep inguinal ring Inside view



musculus spermaticus
musculus inguinalis medialis
ligamentum lacunare
Ligamentum von Rnat'sches Band

Symphysis pubica

Inside view of the abdominal wall



Linea arcuata = Douglas'sche Linie

M. rectus abdominis

A. und V. epigastrica inferior

Ligamentum interfoveolare
= Hesselbach'sches Band

Ductus deferens und Anulus
inguinalis profundus

Ramus pubicus

Nodi lymphoidei lacunaris vasorum
= Rosenmüller'scher Lymphknoten

Ramus obturatorius

Ramus pubicus

Fascia obturatoria und
M. obturatorius internus

Canalis obturatorius

M. transversus
abdominis und
Fascia transversalis

Ligamentum inguinale
= Poupart'sches Band

Peritoneum
(Schnittkante)

A. und V. circumflexa
ilium profunda

N. cutaneus femoris lateralis

M. iliacus und Fascia iliaca

N. femoralis

Ramus femoralis des N. genitofemoralis

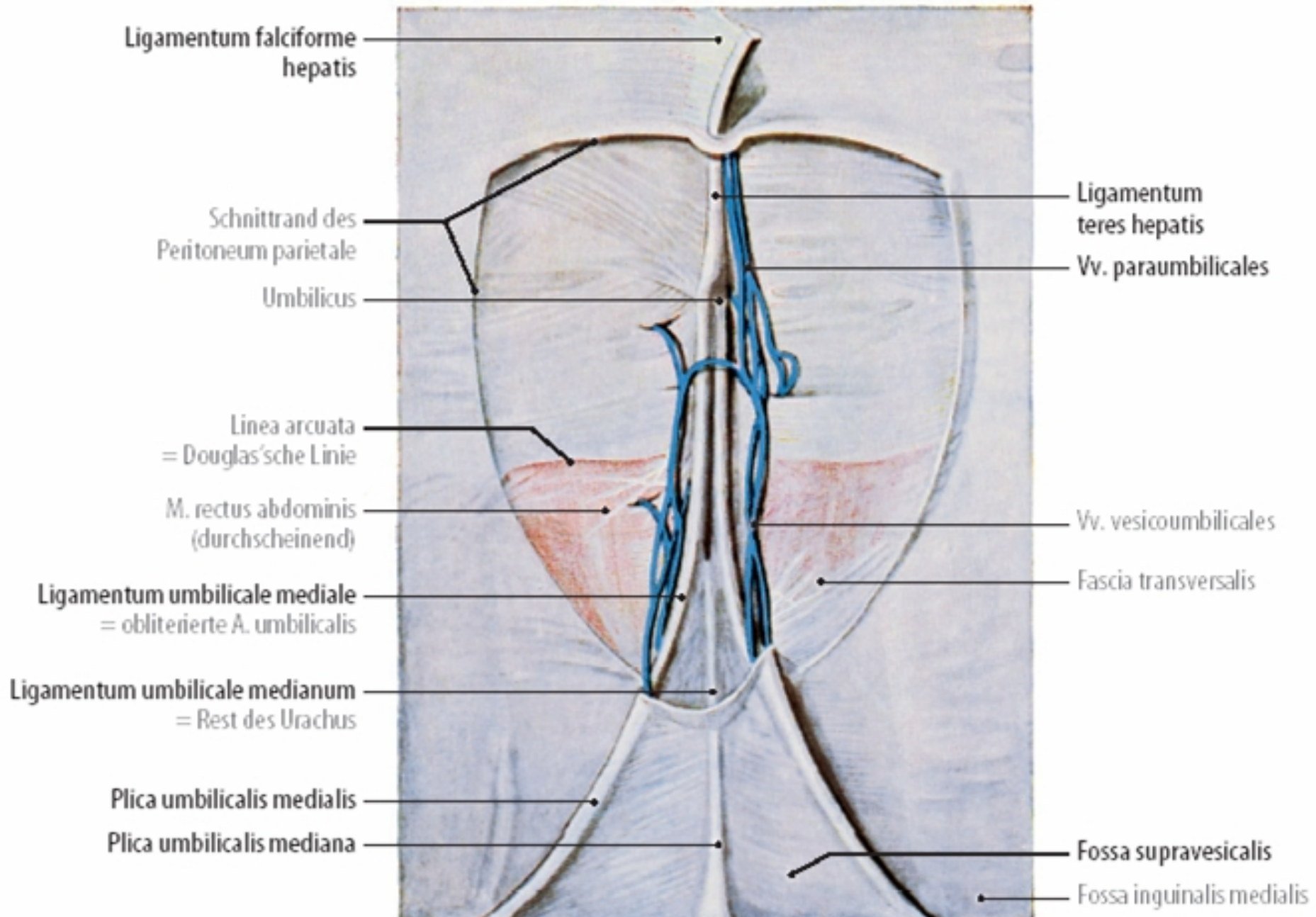
A. und V. iliaca externa

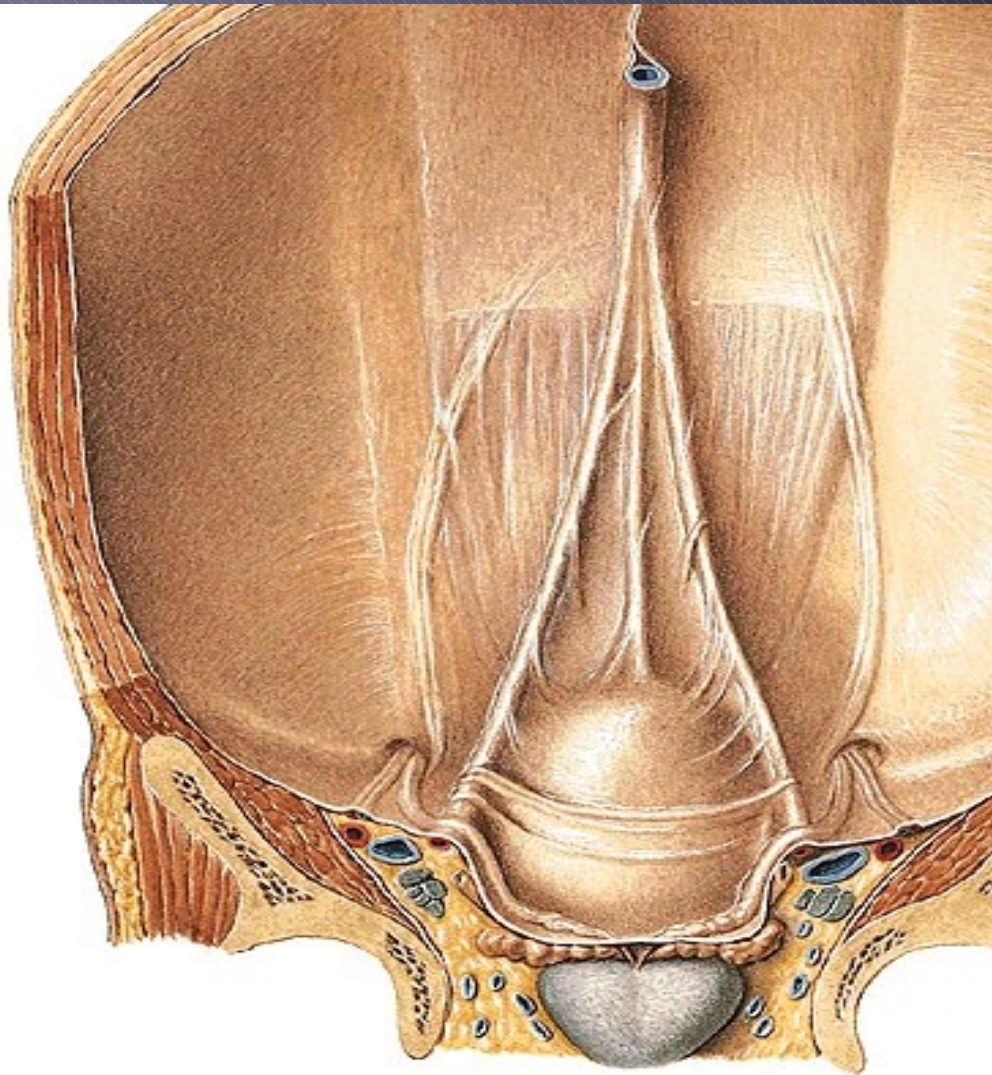
Nodi iliaci externi

N. obturatorius

A. und V. obturatoria

Inside view of the umbilical region





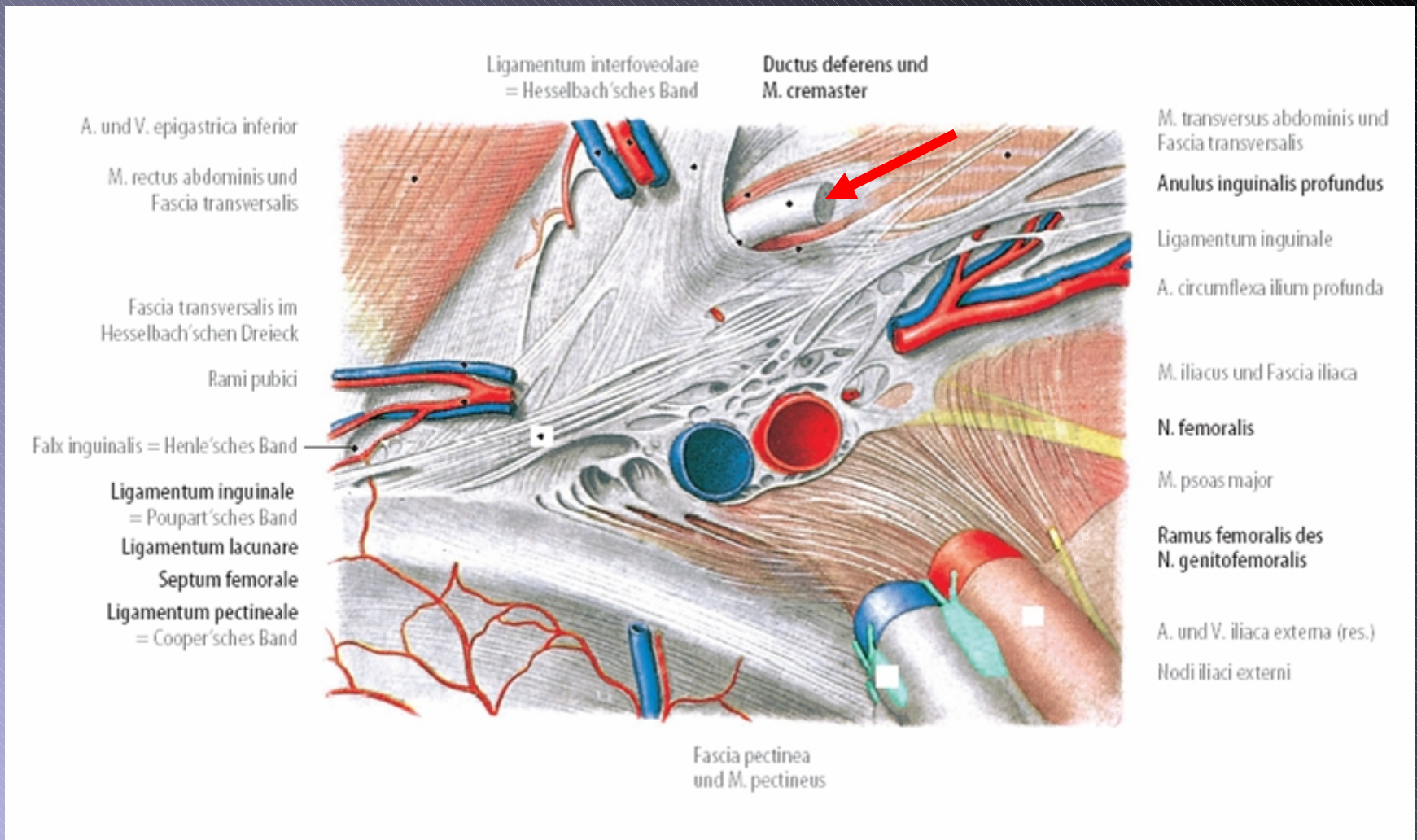
Plica umbilicalis
mediana (urachus),
medialis (a.umbilicalis),
lateralis (vasa
epigastrica inf.)

Fovea supravesicalis

Fovea inguinalis
medialis
(trigonum inguinale)

Fovea inguinalis
lateralis
(anulus ing. prof.)

**Inside view of the
anterior abdominal wall**



Why so many eponymous names?

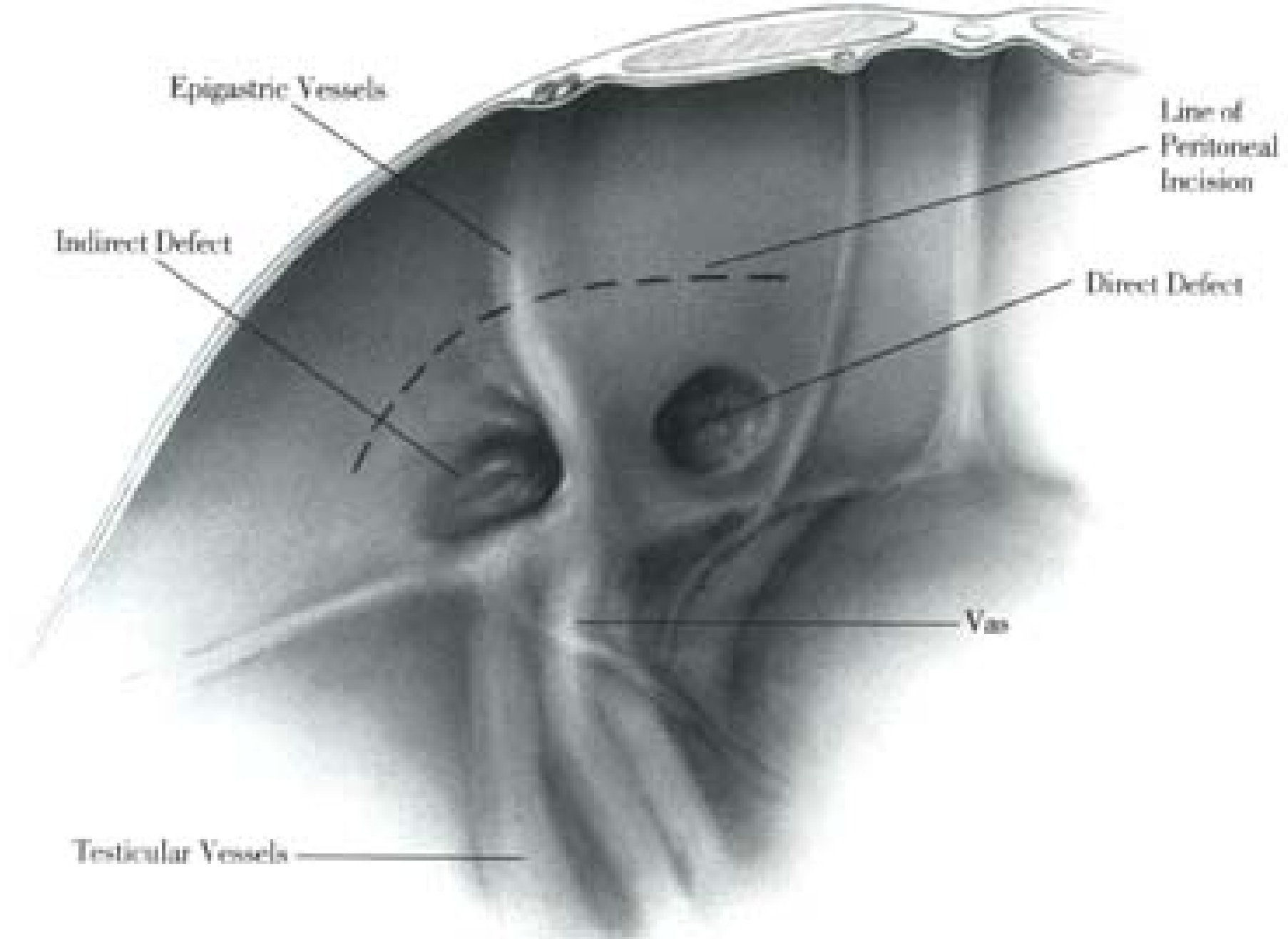
**Hernia supravesicalis –
fovea supravesicalis**

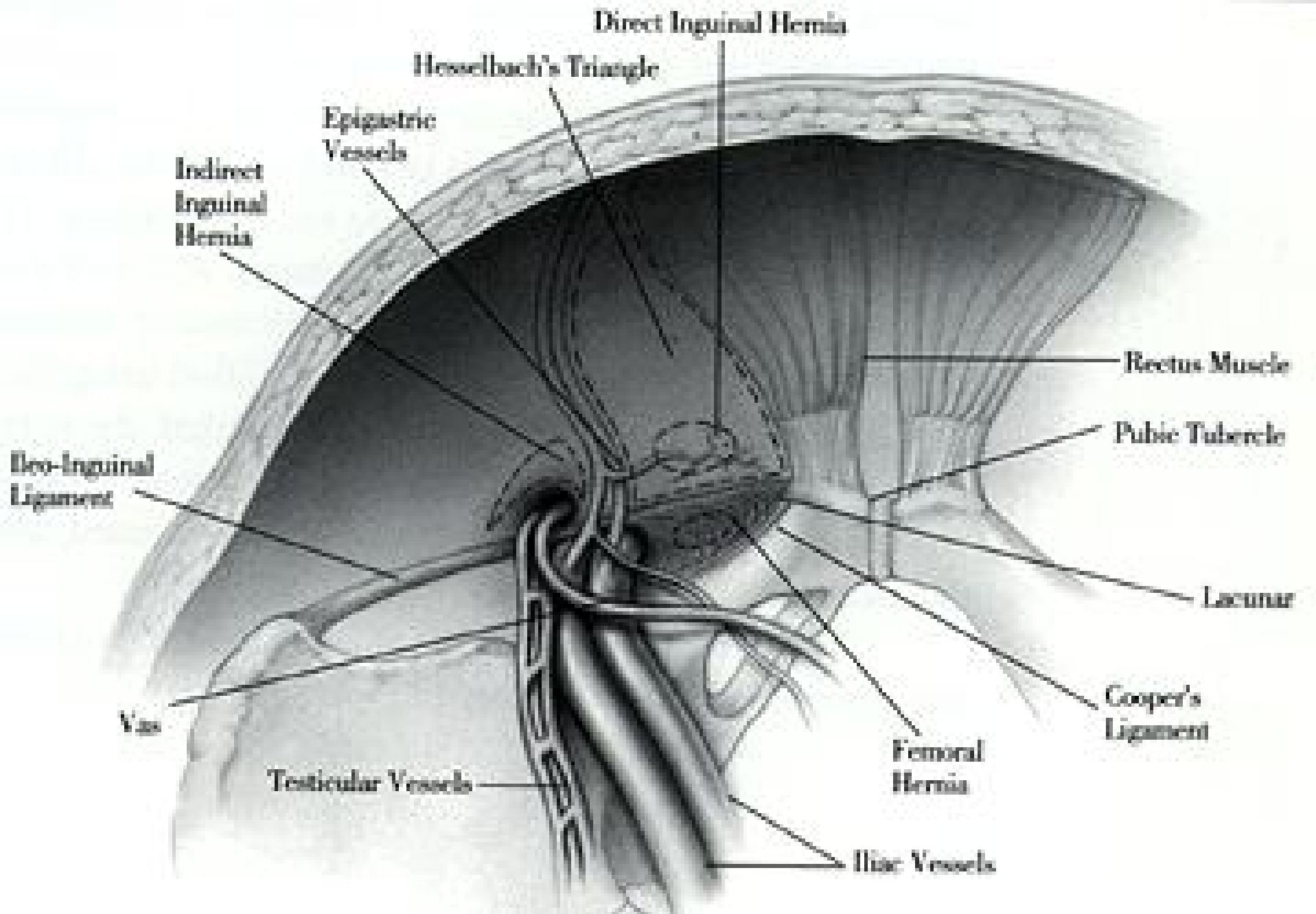
**Hernia inguinalis directa –
trigonum inguinale – anulus ing. spfc.**

**Hernia inguinalis indirecta –
anulus ing. prof. – anulus ing. spfc.**

**Hernia femoralis – septum femorale in
lacuna vasorum- fossa iliopectinea –
hiatus saphenus**

Seminars!







Laparoscope

*Multifire Endo Hernia**
Stapler

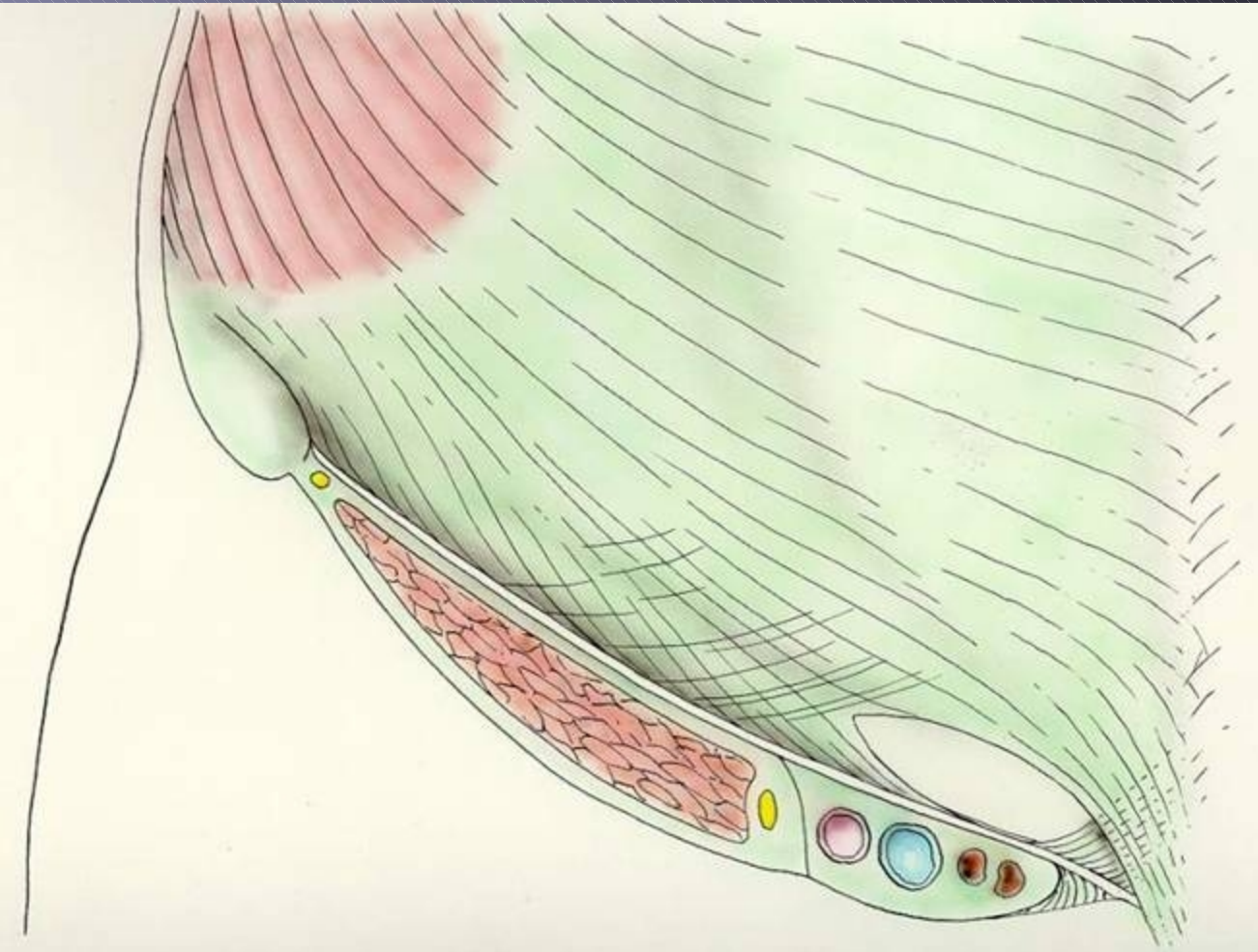
Hernia Site

Inguinal region is clinically important.

Let's review it then once more -

Layer by layer, ligament by ligament:

1st layer – aponeurosis of m.o.a.ext



Lig. inguinale

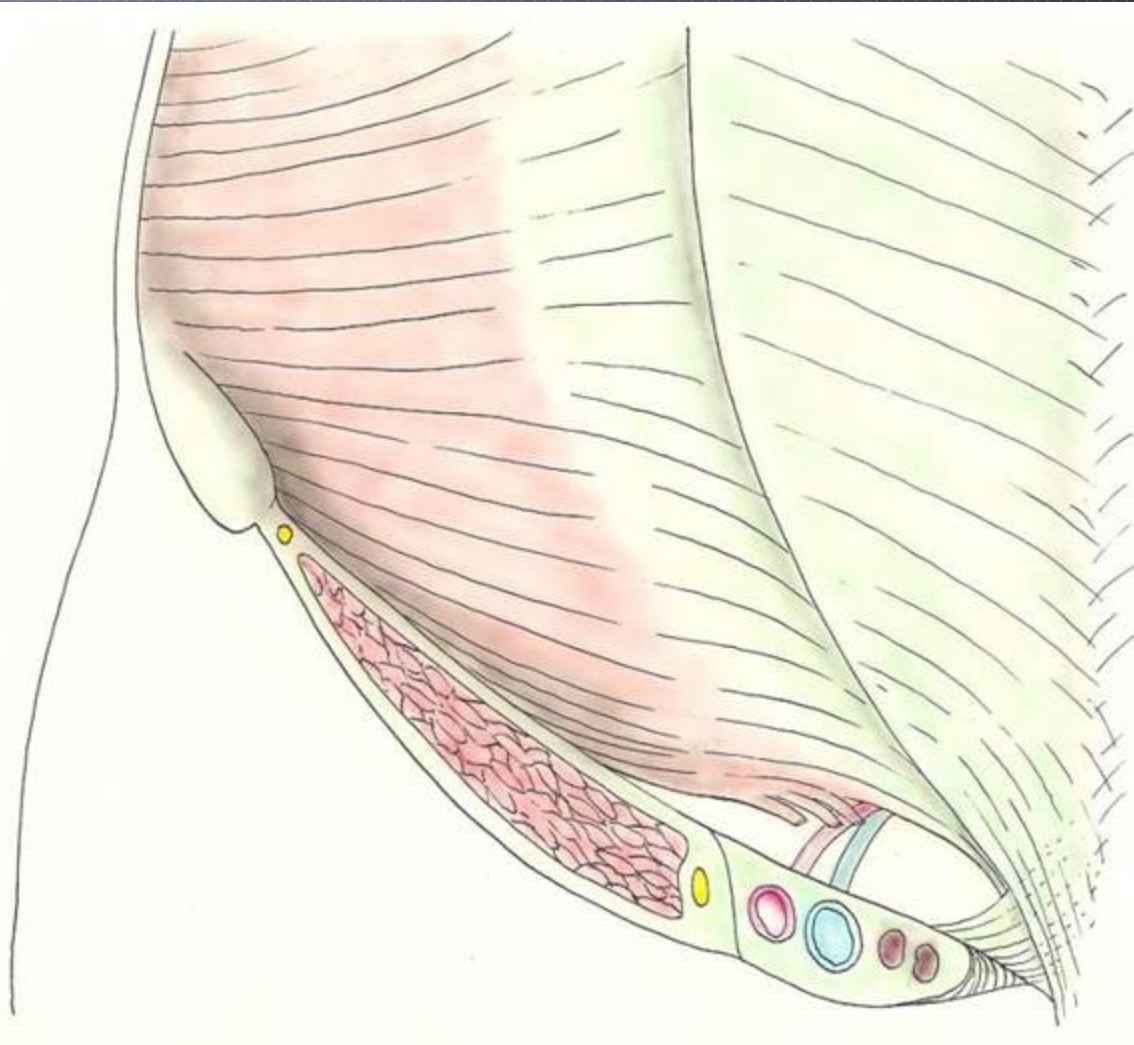
Anulus
inguinalis
superficialis

Crus mediale et
laterale

Fibrae
intercruales

Lig. reflexum

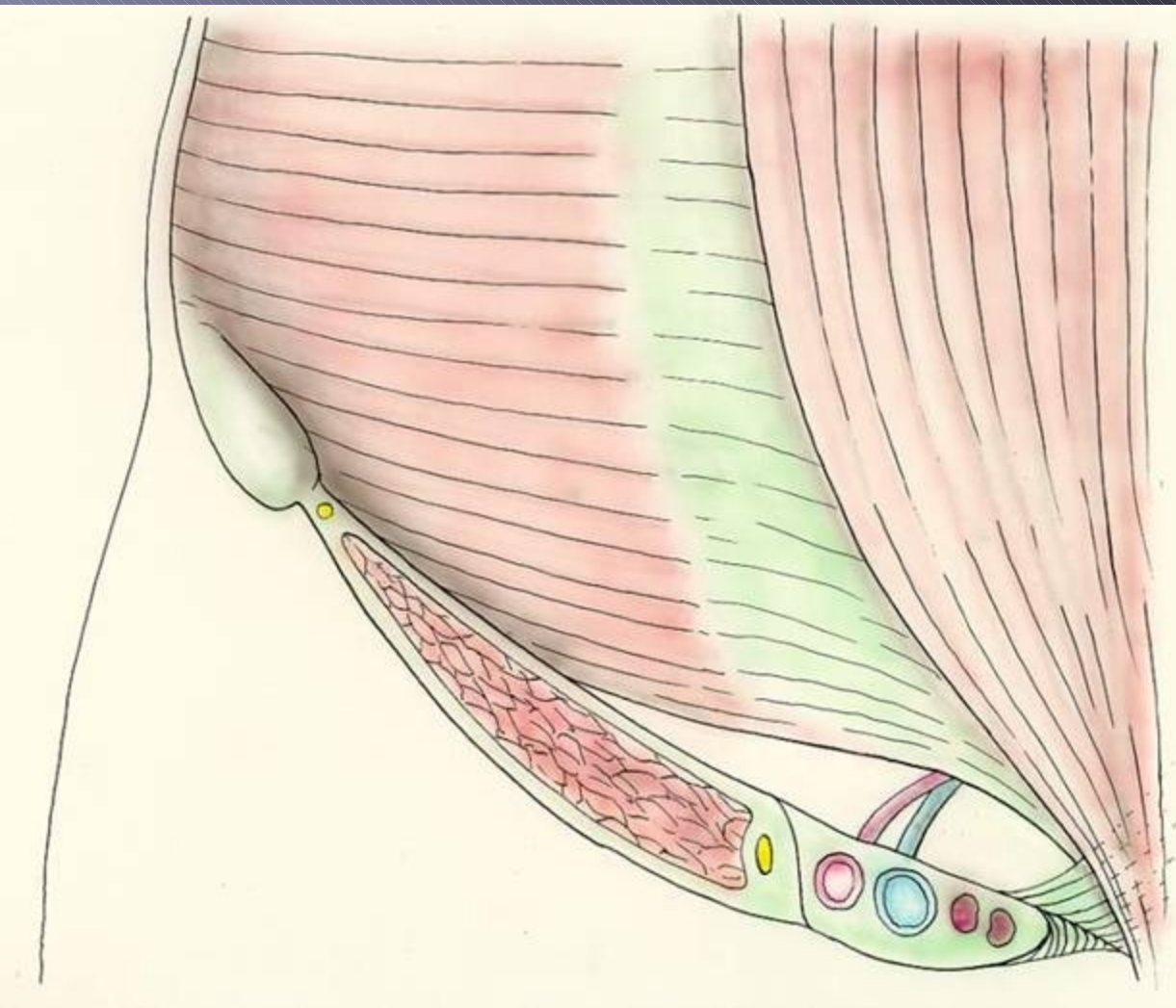
2nd layer – aponeurosis of m.o.a. int.



M. cremaster

Falx inguinalis

3rd layer – aponeurosis of m. tr.a.



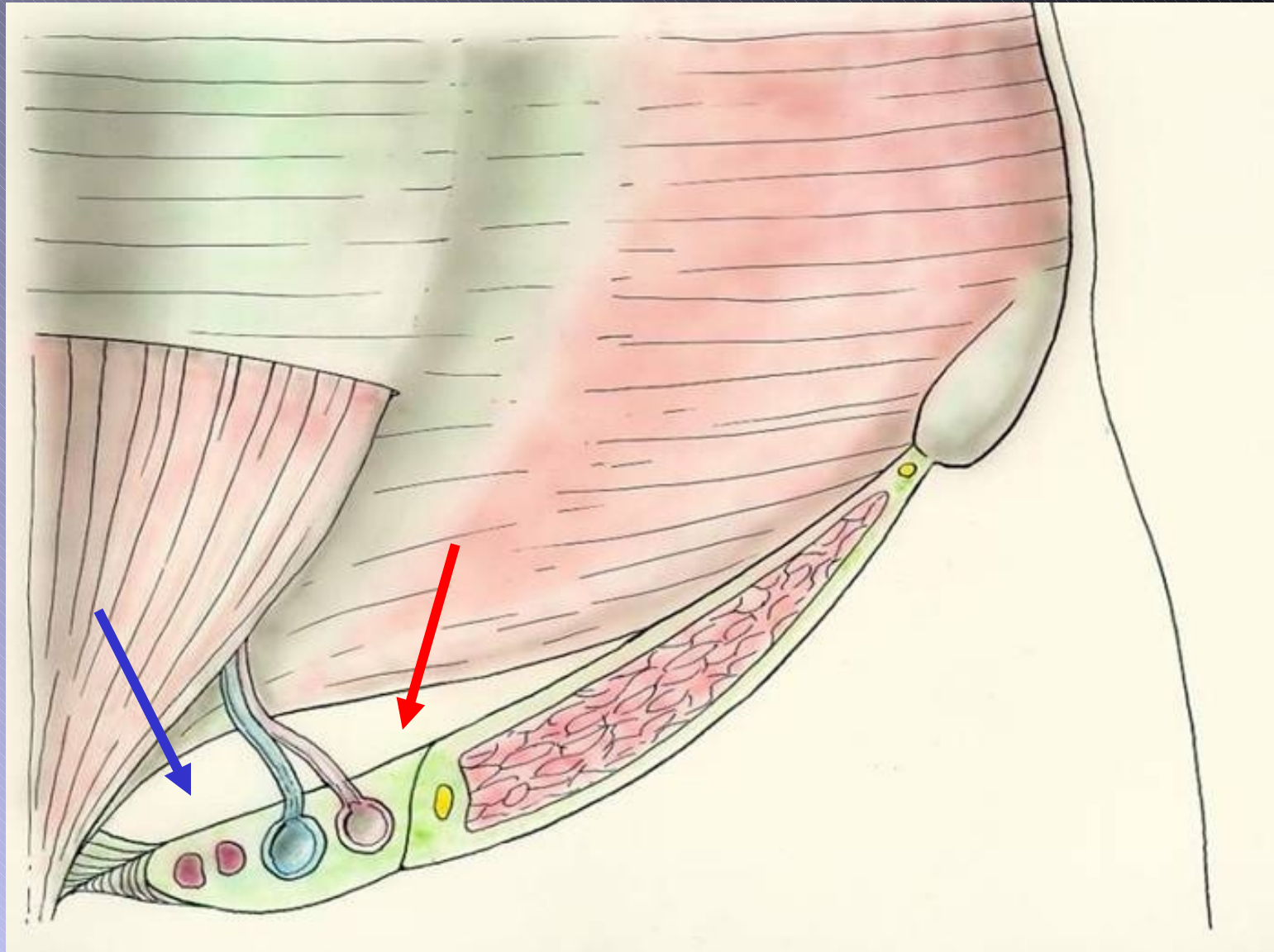
Falx inguinalis

**Anulus
inguinalis
profundus**

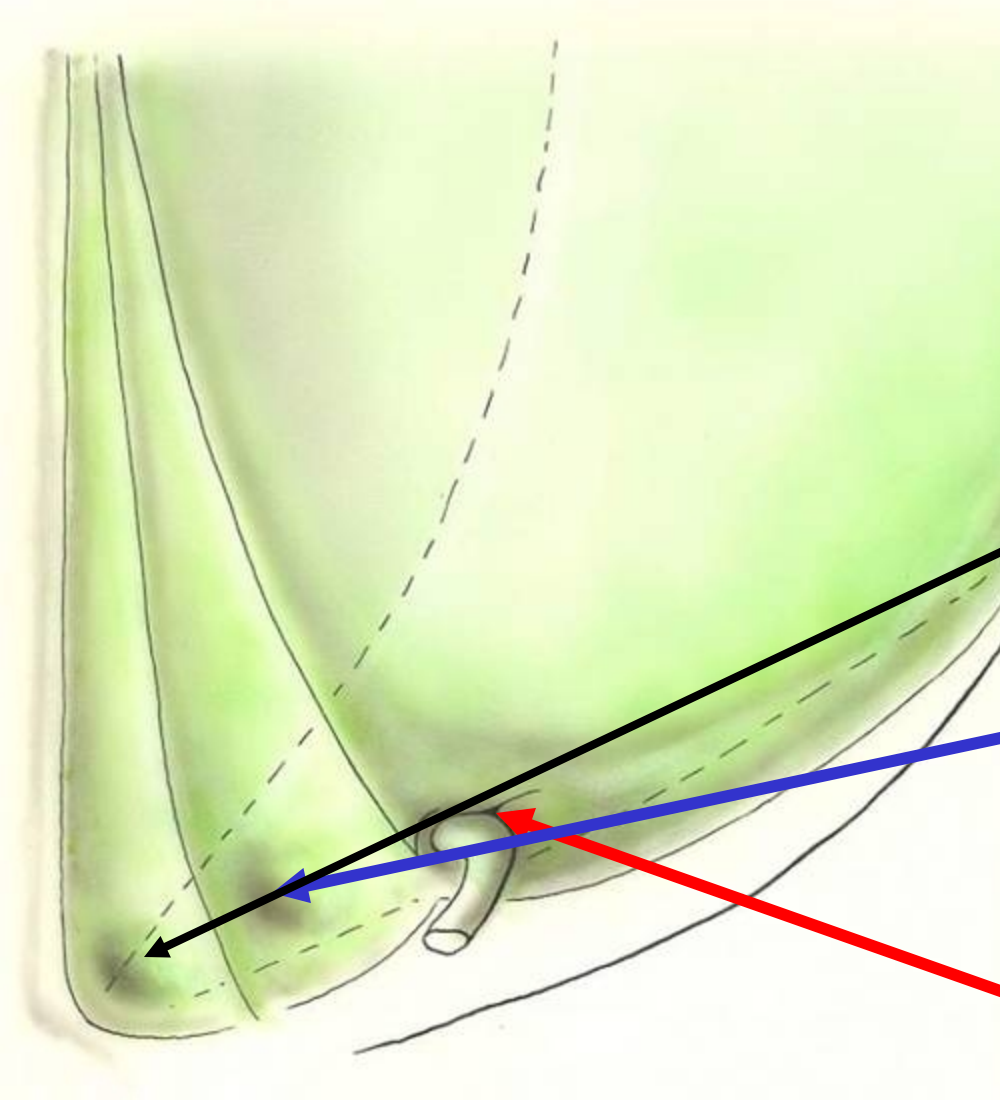
**Trigonum
inguinale**

**Vasa
epigastrica inf.**

Inside view – deep and superficial ring are distinguished by the inferior epigastric vessels



Peritoneal coverings



Plica umbilicalis
mediana (urachus),
medialis (a. umbilicalis),
lateralis (vasa epigastrica
inf.)

Fovea supravesicalis

Fovea inguinalis medialis
(trigonum inguinale)

Fovea inguinalis lateralis
(anulus ing. prof.)

References

- Čihák: Anatomie 1, 3
 - Netter's Anatomical Atlas
 - Sobotta: Atlas of Anatomy
 - Thieme: Anatomischer atlas
 - Tillmann BN: Atlas der Anatomie.
-
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