

Anterior Abdominal Wall:

Midline Furrow/Groove: from xiphoid process above to pubic symphysis below

→ corresponds to linea alba

→ separates the 2 rectus muscles from each other.

Linea Semilunaris: from tip of 9th costal cartilage to pubic tubercle

→ lies few cm away from median furrow on either side

→ corresponds to lateral margin of rectus abdominis

Transpyloric / Addison's Plane: Lower border of L1

→ Key plane of abdomen

→ At this level - pylorus of stomach

- fundus of gall bladder

- Neck of pancreas

- hilum of kidneys

- origin of superior mesenteric artery

- formation of portal vein

- root of transverse mesocolon.

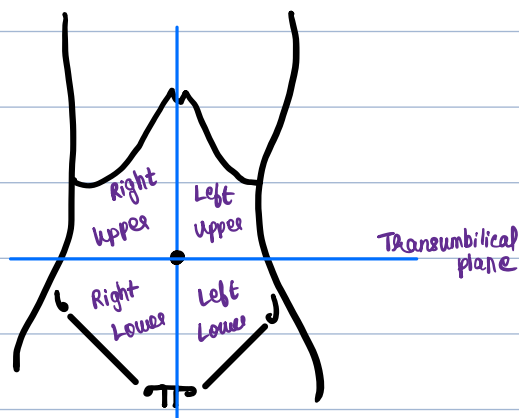
Subcostal Plane: body of L3

Intertubercular / Transtubercular Plane: joins tubercles of iliac crests

↳ body of L5

Right & Left Vertical Planes / Midclavicular Planes: from mid-point of clavicle superiorly to midinguinal point

4 Quadrants:



9 Regions:

1 = Right hypochondrium

2 = Epigastric region

3 = Left hypochondrium

4 = Right lumbar region

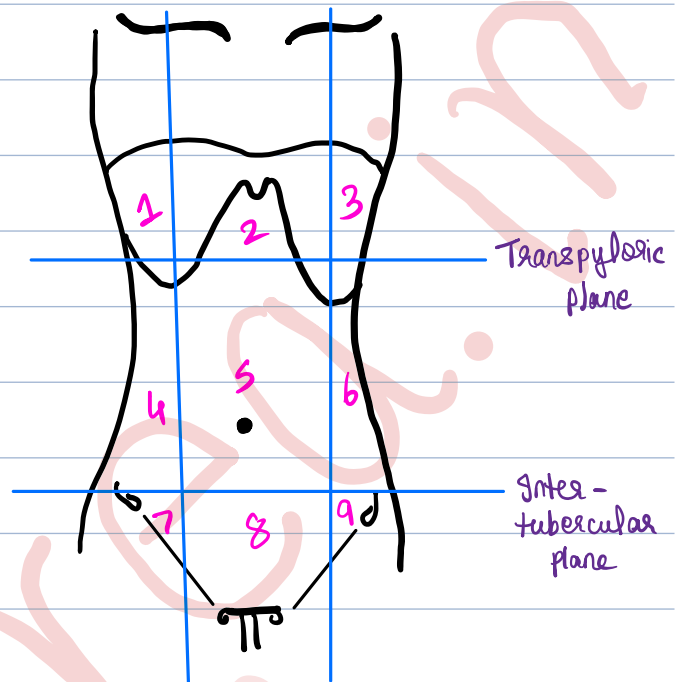
5 = Umbilical region

6 = Left lumbar region

7 = Right iliac fossa

8 = Hypogastric region

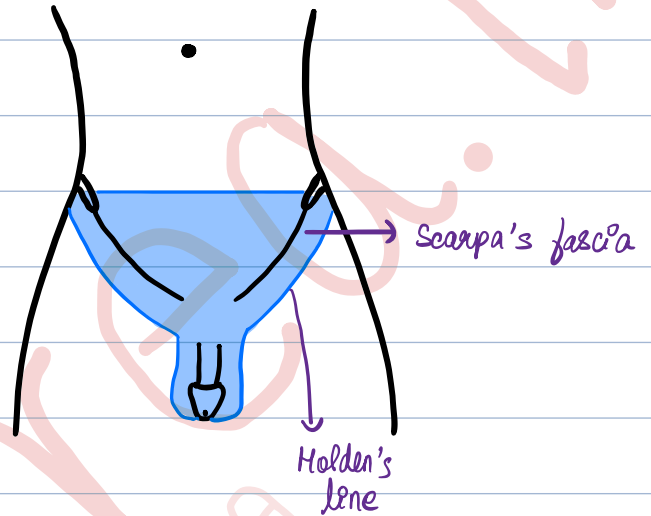
9 = Left iliac fossa



Region	Contents
Right Hypochondrium	• Liver • Gall Bladder
Epigastrum	• Stomach • Pancreas • Duodenum
Left hypochondrium	• Spleen • Left colic flexure
Right Lumbar region	• Right kidney • Right ureter • Ascending colon
Umbilical region	• Loops of small intestine • Aorta • IVC
Left Lumbar region	• Left kidney • Left ureter • Descending colon
Right iliac fossa	• Caecum • Appendix
Hypogastrium	• Coils of small intestine • Urinary bladder (if distended) • Uterus (if enlarged)
Left iliac fossa	• Sigmoid colon

Layers of AAW:

- (i) Skin
- (ii) Superficial Fascia ← Camper's (fatty)
← Scarpa's (membranous)
- (iii) External oblique muscle
- (iv) Internal oblique muscle
- (v) Transversus abdominis
- (vi) Fascia transversalis
- (vii) Extraperitoneal tissue
- (viii) Parietal layer of peritoneum.



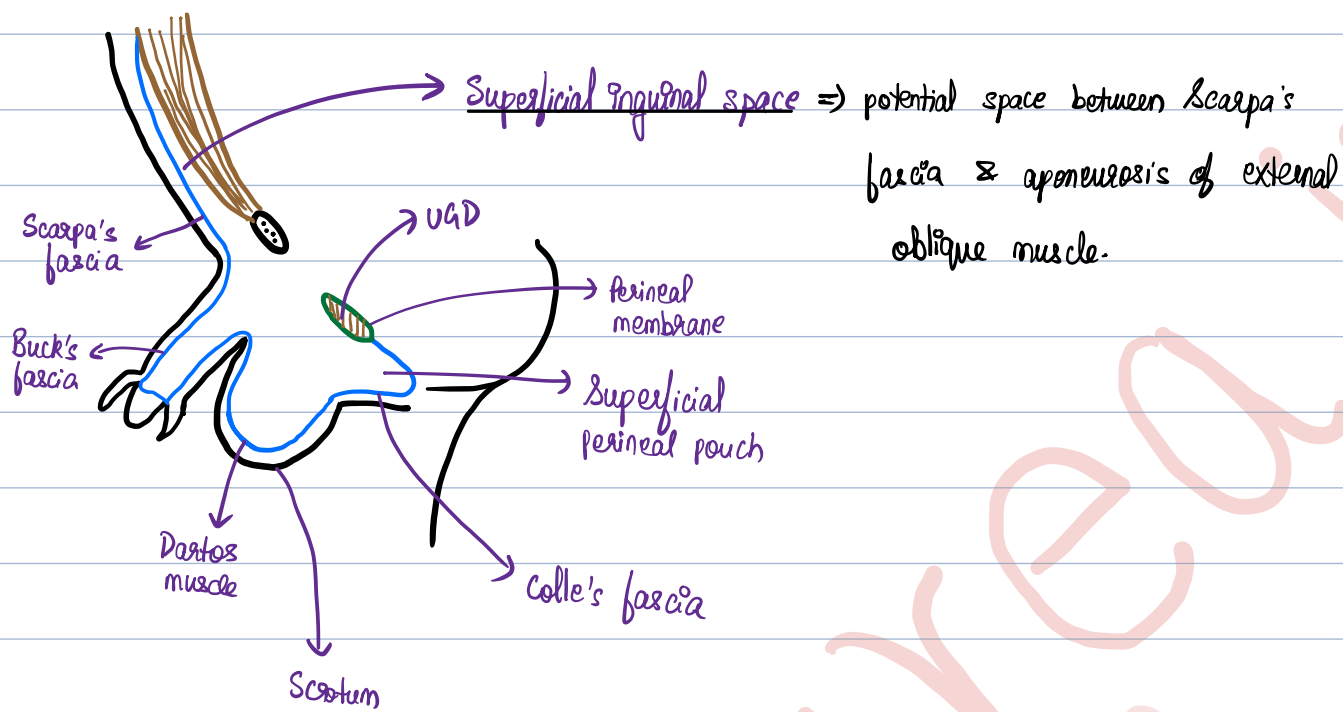
Cleavage / Langer Lines of Skin of AAW:

- run horizontally
- $\therefore$ abdominal incisions should be given horizontally so that the wounds heal with invisible linear scars.

Camper's Fascia: continuous with superficial fascia of adjoining areas

Scarpa's Fascia: attached to linea alba in midline

- Below: crosses the inguinal ligament & gets attached to fascia lata of thigh
- fascia over the penis = Buck's fascia
- in scrotum, replaced by dartos muscle
- continues with Colle's fascia (superficial fascia of perineum)
- attached to posterior margin of urogenital diaphragm (UGD)
- Space between Colle's fascia & perineal membrane $\Rightarrow$ Superficial perineal pouch.
- Line of attachment of Scarpa's fascia with fascia lata $\Rightarrow$ Holden's line.



Applied Aspect:

- Scarpa's & Colle's fascia are such that they prevent the passage of extravasated urine (due to urethral rupture) backward into ischioanal fossae & downward into thighs.
- $\rightarrow$ If male urethra is ruptured in perineum, extravasated urine collects first in superficial perineal pouch & then on to AAW inferior to umbilicus in superficial inguinal space.

Clinical Presentation: — Swollen perineum

— Swollen scrotum

— Swollen penis

— Swollen lower part of AAW.

Umbilicus:

Position: between L3 & L4 vertebrae

(In old age, it comes down to lower level due to reduced tone of abdominal muscles)

Anatomical Significance: → water-shed line

↳ level of T10 dermatome

→ important site for portocaval anastomosis

Embryological significance:

→ midgut loop herniates into umbilical cord during 5th - 10th weeks of IUL (returns back from 10th-12th week)

→ allantois & vitello-intestinal duct project into umbilical cord

Allantois: proximal part ⇒ gives rise to urinary bladder

distal part ⇒ " " " urachus

Vitello-intestinal Duct: persistence of proximal part ⇒ Meckel's diverticulum.

Applied Aspect:

→ Visceral pain of appendicitis (appendix is supplied by T10) is referred to umbilicus.

Faecal fistula: → failure of vitello-intestinal duct to obliterate

Urinary Fistula: → failure of urachus to obliterate ("weeping umbilicus")

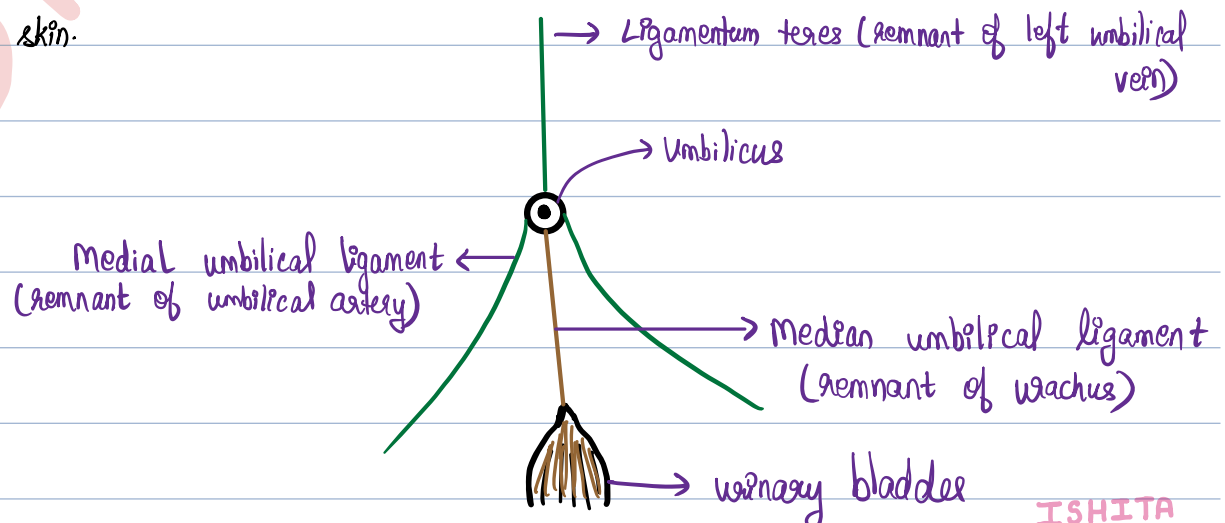
Exomphalos/Omphalocele: → failure of midgut loop to return into abdominal cavity

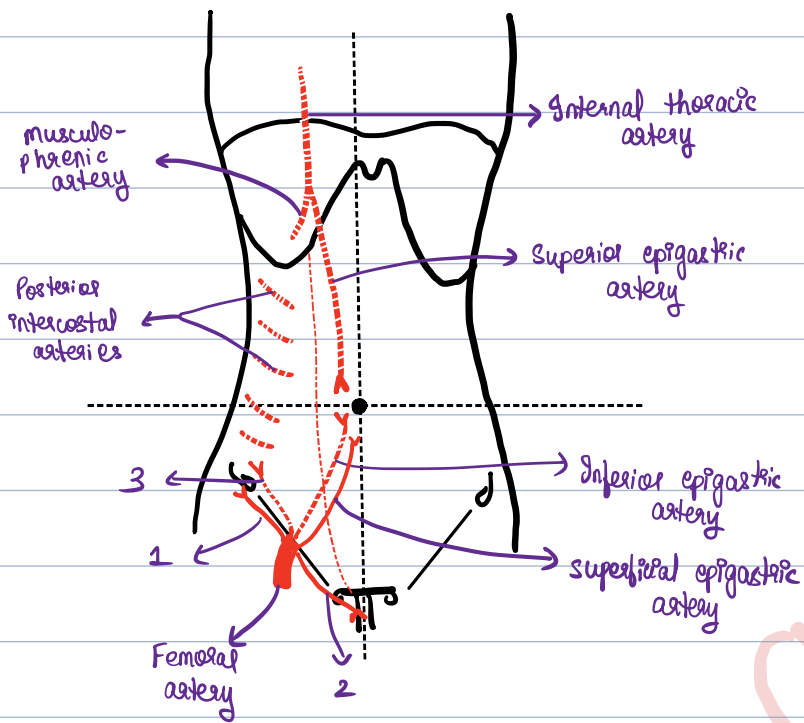
→ intestine protrudes through a defect in all layers of AFW

→ thin transparent membrane (amnion) covers it.

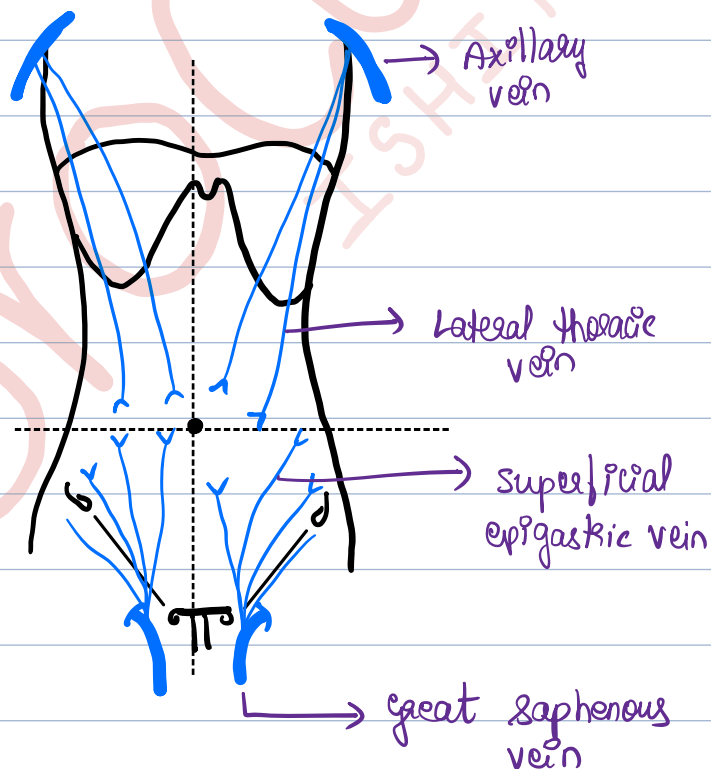
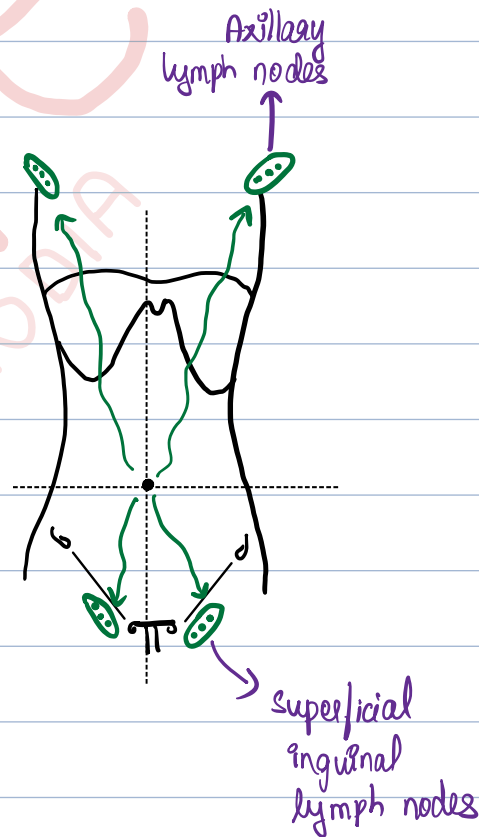
Congenital Umbilical Hernia: intestine protrudes through umbilicus due to weakness of umbilical scar

→ covered by skin.

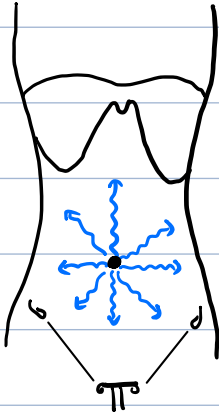




- 1 = Superficial circumflex iliac artery
- 2 = Superficial external pudendal artery.
- 3 = Deep Circumflex iliac artery



Applied Aspect: In portal vein obstruction, when venous drainage through liver is obstructed, backflow of blood may occur through para-umbilical veins towards umbilicus
→ umbilical veins & superficial veins around umbilicus become grossly distended & tortuous & radiate from umbilicus like spokes of a wheel ⇒ Caput medusae.



Muscles:

External Oblique

origin: from 8 fleshy slips from middle of shaft of lower 8 ribs

Insertion: fibres run downward, forward & medially

→ posterior most fibres insert onto outer lip of anterior $\frac{2}{3}$ of iliac crest

→ remaining fibres are inserted into line alba, xiphoid process, pubic symphysis

- extension of external oblique aponeurosis in between ASIS & pubic tubercle forms inguinal ligament.
- gap in the external oblique aponeurosis $\Rightarrow$ superficial inguinal ring

Nerve supply: anterior primary rami of T7 - T12.

Internal Oblique Muscle

origin: - thoracolumbar fascia

- intermediate area of anterior $\frac{2}{3}$ of iliac crest
- lateral $\frac{2}{3}$ of inguinal ligament
- fibres run upward, forward & medially

Insertion: - fleshy fibres insert into lower 3 or 4 costal cartilages

- aponeurotic fibres insert into xiphoid process, linea alba, pubic tubercle, pectineal line

Nerve supply: anterior primary rami of T7 - T12.

- L1 via iliohypogastric & ilioinguinal nerves

Transversus Abdominis

origin: — thoracolumbar fascia

- inner lip of anterior 2/3 of iliac crest
- lateral 1/3 of inguinal ligament
- inner surface of lower 6 costal cartilages

Insertion: xiphoid process, linea alba, pubic crest, postinean line

- lower aponeurotic fibres of internal oblique & transversus abdominis fuse to form $\Rightarrow$ conjoint tendon (falx inguinalis)

Nerve supply: anterior primary rami of T7 - T12.

- L1 via iliohypogastric & ilioinguinal nerves

Cremaster Muscle: series of loops of skeletal muscle fibres joined cremaster fascia (loose areolar tissue)

Origin: from lower arched fibres of internal oblique

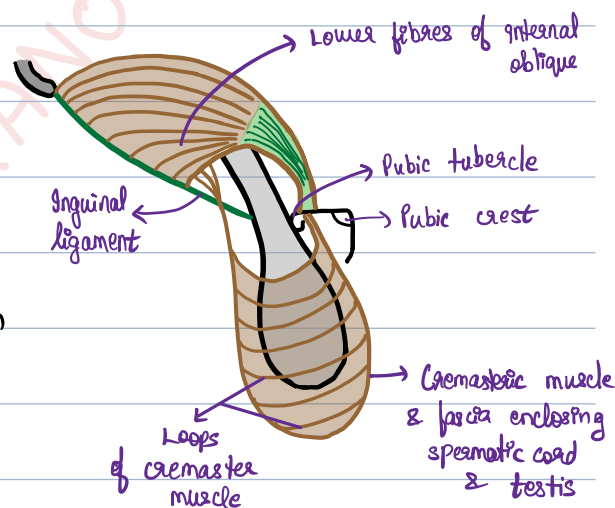
Attached to - pubic tubercle, pubic crest, conjoint tendon

Nerve supply: L1, L2 through genital branch of genitofemoral N.
($\therefore$ not under voluntary control)

Actions: pulls up the testis towards superficial inguinal ring which

helps to plug the SIR

- also helps in controlling the temperature of testis.



Rectus Abdominis

Origin: Lateral head - pubic crest

Medial head - pubic symphysis

Insertion: $\rightarrow$ horizontal fashion - xiphoid process

- 5th, 6th, 7th costal cartilages

Tendinous intersections: divide the rectus abdominis into smaller parts

$\rightarrow$ prevents bow-stringing of the muscle while bending forward

$\rightarrow$ First 3 are complete $\Rightarrow$ 6 packs

$\rightarrow$ 4th is incomplete $\Rightarrow$ difficult to build 8 packs

$\rightarrow$ may be absent

Nerve supply: T7-T12

Pyramidalis: (absent in 20% of people)

Origin: anterior surface of body of pubis

Insertion: linea alba

Nerve supply: T12

Action: it tenses the linea alba