
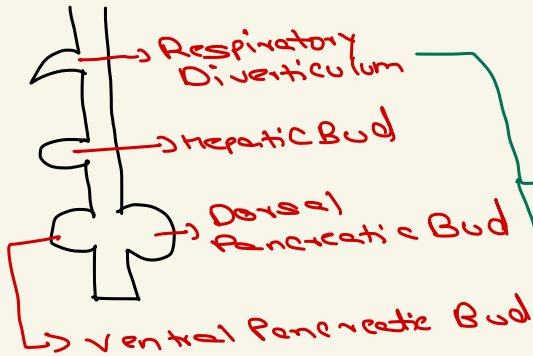


Abdomen 

Foregut Development

- Primitive Dorsal Mesentery → ventral
↓
Dorsal Aorta → midgut - SMA
↳ Hindgut - IMA
xxx gov mid & hind

- Foregut Tube → upto 2nd part of duodenum
↓



- Pharynx, Oesophagus, Stomach, Duodenum 2nd part
- Cranial:- Larynx, Trachea
- ↳ Caudal:- Lung buds & Bronchial buds

→ Tracheo-oesophageal Fold

- ↳ Grows medially, septum prominent
- ↳ Respiratory & foregut tube division

★ Stomach Development - Foregut derivative

- ↳ I (vertical, 90°)
- ↳ Ant. - Right Border (Lesser Curvature)
- ↳ Post. - Left Border (Greater Curvature)

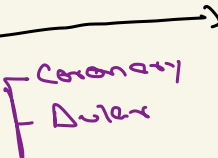
↳ II (AP axis, 90°, clockwise)

- ↳ 1 - Left side
- ↳ 2 - Right side

Dorsal forms Greater omentum

★ Ventral mesogastrium

- ↳ Anterior:- Liver, Falciform ligament
- ↳ Posterior:- Stomach



★ Gastrosplenic: - Stomach to spleen

★ Lienorenal: - Spleen to post. abdominal wall.

★ Development of lesser sac: -

• Stomach clockwise ↻ Liver on right
Spleen on left

↓
Small space behind stomach: - Lesser sac

• Foramen Winslow: - Communication b/w lesser & greater sac.
↳ Stomach rotation → Right, C shape

★ Development of duodenum - Foregut → midgut

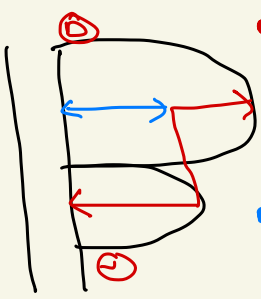
↳ Retroperitoneal (mesoduodenum disappears)
↳ X Promial 2.5cm (hepato-duodenal)

★ Development of liver

• Hepatic Bud: - Parenchyma of liver & biliary system
• Septum transversum: - Ct, capsules, sinusoids, Kupffer cells

★ Development of pancreas

• Dorsal: - All except
• Ventral: - Lower part of head of pancreas
↳ Uncinate process



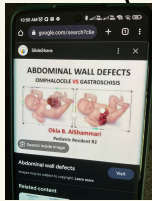
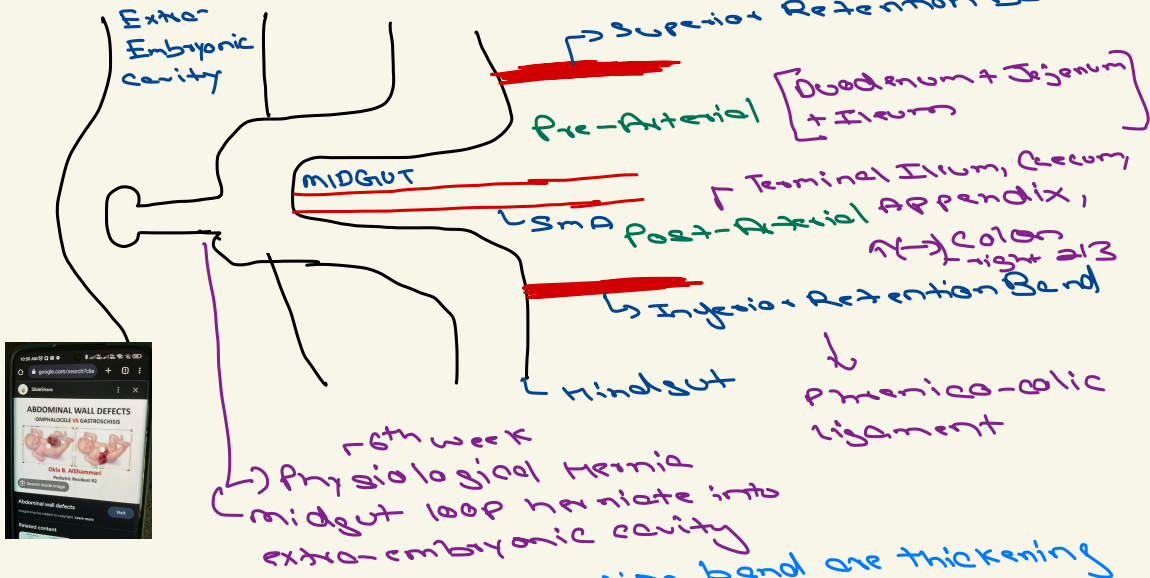
● - Major Pancreatic Duct
↳ Duct of Wirsung
↳ Whole of ventral duct + Distal part of dorsal duct

● - minor Pancreatic Duct

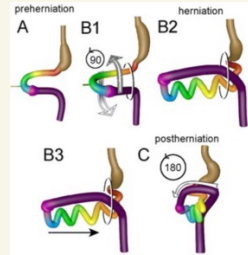
• Pancreatic Divisum: - Buds not unit fold
• Annular Pancreas - Bilobed ventral bud
↳ Duodenal obstruction

Development of midgut

Diagram



→ Superior & Inferior retention band are thickening of primitive dorsal mesentery.



Meckel's Diverticulum

- ↳ Proximal part of VLD persist
- ↳ Anti-mesenteric Border

Rotation of midgut [Axis: SMA]

- ↳ I - 90° Anti-C
- ↳ Pre → Right
- ↳ Post → Left

- Return of midgut loop into cavity
- ↳ Regression of mesonephric kidney
- ↳ Expansion of abdominal cavity
- ↳ Reduced growth of liver

• Omphalocele - Failure of reduction of physiological hernia, sec, any organ

• Gastroschisis - hernia at site of right + umbilical vein, xx sec, only intestinal loop

↳ After Swerts

↳ Midgut rotate 180°

↳ Total 270°

↳ Cecum below liver

↳ Desc ends to RIF

↳ Diff. into various part of colon, Appendix

Anterior Abdominal wall

• Transpyloric Plane: - midpoint b/w suprasternal notch to pubic symphysis

↳ Lower border of L1, 9th costal cartilage tip, kidney hilum, origin of SMA, Termination of SC, Pylorus of stomach, Portal vein formation

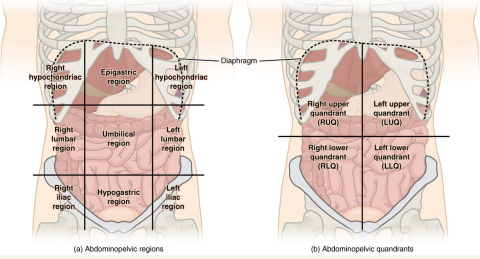
• Subcostal plane

↳ Lower border of L2, 10th costal cartilage

• Trans tubercular plane

↳ Upper border of L5, origin of IVC

Layers (O → I)



Skin
 ↓
 O → C - Camper (Fatty)
 SF → I - Scarpa (Membrane)
 ↓
 EO → IO → TA → EF
 ↓
 Parietal layer of peritoneum

• Neurovascular plane

↳ below internal oblique ↳ transverse abdominis

• Ext. Oblique (↳ part fold ↳ back - inguinal ligament)

O - Middle of lower 8 ribs

I - Outer tip of iliac crest

Linea Alba (↳ F, M)

N - T7 - T12

• Int. Oblique (↳ TA Conjoint Tendon)

O - Lateral 2/3 of IL

↳ Anterior 2/3 of intermediate lip of iliac crest (↳ F, M)

↳ Thoracolumbar fascia

I - 7, 8, 9 costal cartilage, Linea Alba

NS - T7 - L1

• EO + IO - lateral flexion of trunk

• Transversus Abdominis

O - lateral 1/2 of IL

↳ Anterior 2/3 of inner lip of iliac crest

↳ Thoraco-lumbar fascia

I - Conjoint Tendon, Linea Alba

NS - T7 - L1

Actions

EO + IO + TA

↳ Abdominal Ton ↑

↳ IntraA pressure

↳ Mict Def

[Conjoint Tendon = Falx inguinalis]

- Inguinal Ligament - ASIS to pubic tubercle
- ↳ mid-point of IL - mid-point of ASIS to pubic tubercle
- ↳ mid-Inguinal :- mid-point of ASIS to pubic symphysis
- ↳ 1.25cm above :- Deep Inguinal Ring
- Extension of IL
- ↳ Reflected part of IL
- ↳ Pectineal Ligament of Cooper
- ↳ Lacunar Ligament

[Aponeurotic sheath of ABL recti fuse in midline to form linea alba]

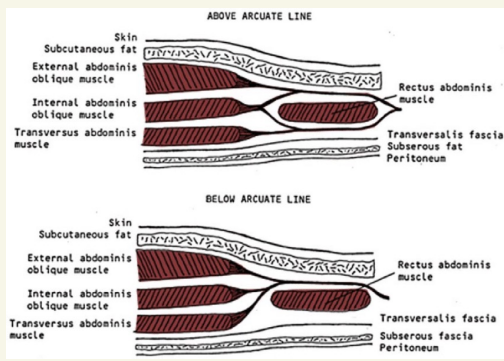
★ Rectus Sheath →

Contents :- Terminal part of lower 5 intercostal nerve & sub-costal nerve

- ↳ Rectus Abdominis, Pyramidalis
- ↳ Sup. & Inf. EpiG arteries & vein

Rectus Abdominis

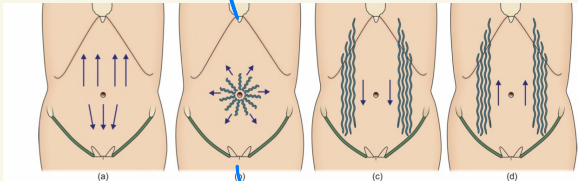
- O - Pubic Crest & Pubic Tubercle
- I - 5, 6, 7 costal cartilages
- NS - T7 to T12
- A - Flexion of trunk, torso,
- P - E - S - U - P



• Tendinous Intersection of rectus abdominis

:- P - event bow - stringing
Dilated & tortuous vein from umbilicus

- Pyramidalis
- O - Pubic Symphysis
- I - Linea Albe
- NS - Subcostal nerve
- A - ↑ Tension of Linea Albe

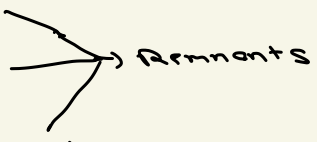


Figs 16.5a to d: The subcutaneous venous circulation in: (a) Normal subjects, (b) portal obstruction showing caput medusae, (c) superior vena caval obstruction, and (d) inferior vena caval obstruction (arrows indicate the direction of blood flow)

↳ Paraumbilical vein & Subcutaneous vein

• Ligamentum Testes

- median umbilical Ligament
- ABL medial umbilical Ligament



- ↳ Left Umbilical Vein
- ↳ Urachus
- ↳ 2 Umbilical arteries

Cremasteric Reflex (Lost in ↑ motor neuron lesion)

- A - Femoral of GF
- E - Genital of GF
- ↳ stroke skin on ↑ medial part of thigh
- ↳ contraction of Cremaster muscle
- ↳ elevation of testis (L1, L2)

Contents- ← Inguinal Canal

- True:- Spermatic Cord, Round Ligament
- False:- Ilioinguinal Nerve

★ Scrotal Layers [TAX]

- Skin:-
- Dartos: - SF
- Ext. Spermatic Fascia - EO
- Cremasteric Muscle - IO
- Int. Spermatic Fascia - FT

- Deep Ring - Defect in FT, 1.25cm above mid-inguinal point
- SF Ring - Defect in EO, above & medial to pubic tubercle

- ### Spermatic Cord Content
- Testicular Artery
 - Pampiniform plexus of vein
 - Testicular Nerve
 - VD - Artery to VD
 - Cremasteric Artery
 - Genital of GF

Inlet	Anterior Wall	Roof
Deep ring	External oblique muscle	Internal oblique and transverse abdominis muscle
Outlet	Posterior Wall	Floor
Superficial inguinal ring	Fascia transversalis	Lacunar ligament and Inguinal ligament (formed by the external oblique muscle)

- Antero-lateral
- ↳ Internal Oblique
- Postero-medial
- ↳ Conjoint Tendon
- ★ Hesselbach Triangle
- M - Lateral of AA
- L - Inf. epigastric artery
- I - Inguinal Ligament

Direct hernia	Indirect hernia
Seen during old age. Acquired hernia due to weakness of anterior abdominal wall muscles.	Seen in young age group congenital hernia.
Occurs through Hesselbach's triangle.	Occurs through inguinal canal.
Inferior epigastric artery is lateral to direct hernia.	Inferior epigastric artery is medial to indirect hernia.
Direct hernia does not reach the scrotum and is not covered by spermatic fascia.	Indirect hernia reaches scrotum and is covered by spermatic fascia.

Flap-valve mechanism
The increased intra-abdominal pressure approximates the anterior and posterior walls and obliterates the inguinal canal.

Slit-valve mechanism
The contraction of external oblique approximates two crura of the superficial inguinal ring.

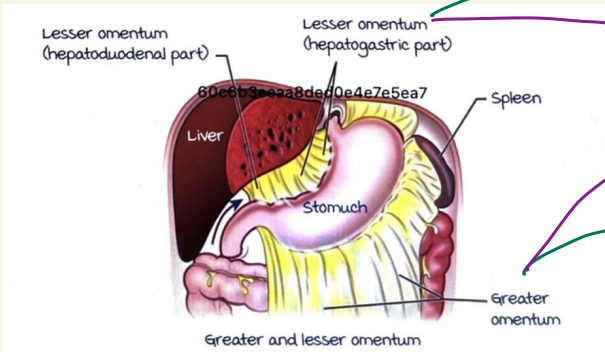
Shutter mechanism
The contraction of the arching fibers of the internal oblique approximates the roof with the floor of the inguinal canal like a shutter.

Ball-valve mechanism
When the cremaster muscle contracts, it draws upward the spermatic cord to plug the superficial inguinal ring.

Peritoneum

- **Parietal:** - Lines body wall
- **visceral:** - Surrounds organ, reflection of parietal

★ Omentum, of stomach



connect stomach & liver

R&L gastric artery

R&L Gasto-epiploic

connect stomach & transverse colon

Right free margin of LO

(hepato-duodenal)

→ mesocolon

[suspend from post. abdominal wall]

Portal Triad

- Portal vein
- Proper hepatic artery
- Bile duct

Transverse

Sigmoid

→ D3 junction to ileo-caecal junction
→ L2 to right sacroiliac joint

★ Mesentery

SMV, SMV
Jejunum, Ileum

↳ Border - Attached - Root of mesentery
↳ Free - Intestinal Border suspending jejunum & ileum

• Structure crossed by Rom

↳ III part duodenum, Abd. Aorta, IVC, R. Gonadal, R. GF, R. Ureter, R. Psoas major

• Fateiform Ligament: - Umbilicus to liver

↳ Free edge: - Ligamentum Teres & Remnant of left umbilical vein

• Epiploic Foramen

↳ Connect lesser sac with greater sac

↳ A → Right free margin of lesser omentum

P → IVC

S → caudate lobe of liver

I → 1st part of duodenum



Stomach - Left Hypoc, EpiG, Umbilical

- 2 end, 2 border, 2 surface

- **Cardiac End** - 2.5 cm left of median line at T11
- ↳ Physiological sphincter
- **Pyloric End** - 1.5 cm right of median line at L1
- ↳ Anatomical sphincter
- ★ **Lesser Curvature** - Right border
- ↳ most dependent: - **Incisure angularis**

To greater curvature line
 ↳ Above: - Body
 ↳ Below: - Pylorus

- ★ **Greater Curvature**
- ↳ Greater Omentum
- ↳ Gastro-splenic
- ↳ Gastro-phrenic

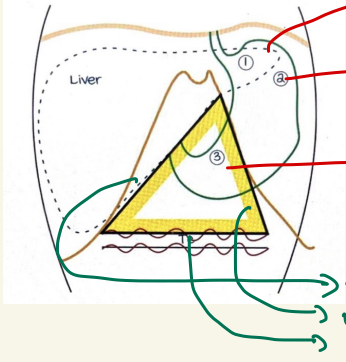
• **Fundus**: - Part above horizontal line drawn from cardiac notch to greater curvature

Pyloric antrum	Pyloric canal	Pylorus
Proximal wide part: 7.5 cm	Distal narrow tubular part: 2.5 cm	Distal most sphincteric part of the pylorus. Position is indicated by prepyloric vein of Mayo.

Sulcus intermedius: Inconstant sulcus between pyloric canal and pyloric antrum.

- **Poiry's manoeuvre**
- ↳ Clamp structure at right free margin of lesser omentum
- ↳ lower 2/3 to transverse colon
- **Greater Curvature**
- ↳ Greater Omentum
- ↳ Gastro-splenic
- ↳ upper 1/3 to spleen

- **Gastro-phrenic** - Fundus to Diaphragm
- ↳ at 1/2 of ant. of stomach ↔ left lobe of liver



- ↳ Lt. 1/2 ↔ Diaphragm
- ↳ Lower - Direct contact with ant. abdominal wall

R: - Ing. margin of liver } Gastric A
 L: - Costal margin } Feeding
 I: - Transverse colon } Gastrostomy

• Stomach Bed (Post. surface)

- ↳ Diaphragm
- ↳ Lt. kidney → Sup-renal
- ↳ Spleen → Splenic Artery
- ↳ Ant. surface of pancreas
- ↳ Splenic flexure
- ↳ Transverse mesocolon

Veinous Drainage

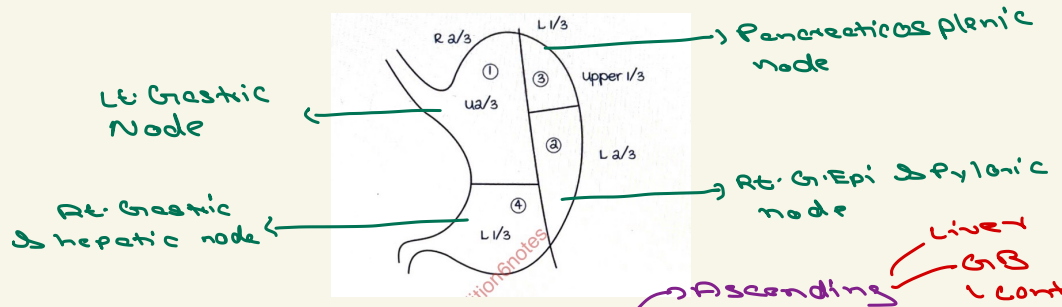
- L & R Gastric Vein → Portal Vein
- Short Gastric Vein → Splenic Vein
- ↳ Lt. GastroEpi
- Right Gastroepi → SMV

★ Blood Supply → Smallest branch of Coeliac Trunk

- Principle: - Lt. Gastric Artery } Lesser Curvature
- Rt. Gastric: - Proper Hepatic Artery } Greater Curvature
- Lt. GEpi: - Splenic Artery } Supplies fundus
- Rt. GEpi: - GA Artery
- Short Gastric Artery → Splenic Artery

★ Lymphatic Drainage

↳ All → Celiac Node



★ Nerve Supply

- ↳ Vagal → Right - Anterior → Gastric
- ↳ Vagal → Right - Posterior → Coeliac plexus
- ↳ Vagal → Left - Anterior → Pylorus
- ↳ Vagal → Left - Posterior → Ant. nerve of Latarjet
- Ascending damage - Bile stasis → Bile stone
- ↳ Post. nerve of Latarjet
- ↳ Nerve of Grassi

★ High selective vagotomy

- ↳ Nerve of Latarjet remove
- ↳ Nerve supplying pylorus preserve
- ↳ Recurrence ✓
- ↳ Nerve of Grassi not removed

★ Truncal Vagotomy

- ↳ Entire trunk remove
- ↳ X recurrence

SMALL INTESTINE

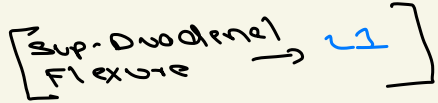
- Retro-peritoneal, except proximal 2.5cm
- I → Superior: - 5cm
- II → Descending: - 7.5cm
- III → Horizontal: - 10cm
- IV → Ascending: - 2.5cm

★ I

- ✓ Circular folds
- ✓ Duodenal ulcer mc
- ✓ Duodenal cap (xray) - only foregut
- A → Quadratic lobe of liver & GB
- P → Retro D part of CBD, GD artery, Portal vein, IVC
- LB I = Supra
- LB II = Retro
- LB III = Infr
- S → Epiploic foramen
- I → Head of pancreas

★ II - ✓ Circular folds

- ✓ Foregut & midgut
- Major Duodenal Papillae - Postero-medial part of II of duodenum
- A - Liver, Transverse colon, Jejunum
- P - Rt. Kidney, Ureter, Psoas major, IVC



★ III - Infr duodenal flexure to abdominal aorta

- A - SMA, SMV, Root of mesentery
- P - IVC, abdominal aorta, Rt. Psoas major, Rt. Ureter, Rt. Gonadal

★ IV

- A - Transverse colon, meso colon, stomach
- P - Left crus of diaphragm, L. Psoas major, L. Sympathetic chain, L. Renal vessel, L. Gonadal, Irv.

★ Blood Supply

- Sup. PD - GD artery
 - Infr. PD - SMA
- I - Rt. Gr. Epi & Rt. G
 - II - Jejunal (SMA)

- Venous - Splenic + SMV → Portal vein
- Lymphatic - Pancreaticoduodenal node.



492 Abdomen

67

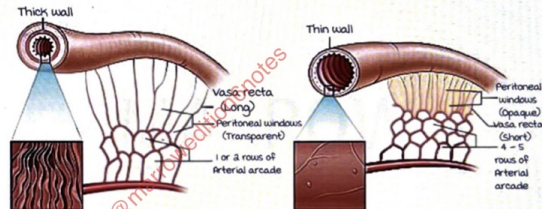
Leave Feedback

Jejunum and ileum

00:34:12

	Jejunum	Ileum
Location	Upper lateral end	Lower medial end
Circular folds	Prominent	Very few. No circular folds in terminal part of ileum.
Arterial arcades	1 - 2	4 - 5
Vasa recta	Long	Short
Peyer's patches	Very rare or few	Seen in antimesenteric border.

Peyer's patches are lymphocytic aggregates and are characteristic feature of ileum.



Jejunum	Distinguishing feature	Ileum
Deeper red	Color	Pale pink
2 - 4 cm	Diameter (caliber)	2 - 3 cm
Thick and heavy	Wall	Thin and light
Greater density. Long vasa recta. Few large arterial arcades.	vascularity	Lesser density. Short vasa recta. Many short arterial arcades.
Less	mesenteric fat	Plenty
Large, tall and closely packed	Circular folds	Low and sparse, possibly absent
Few	Peyer's patches	Many

Active space

LARGE INTESTINE

- X Appendix, Rectum

Cardinal → Tinea Coli - Aggregation longitudinal muscle

Features → Sacculations - SAC

↳ Appendices epiploicae - Fat-filled peritoneal pouches
LX CAR

• Length (inch)

↳ Ascending: - 5

↳ Transverse: - 20

↳ Descending: - 10

↳ Sigmoid: - 15

Appendix - midgut

↳ Appendicular artery → IC → SMA

↳ Mesappendix

↳ 2cm - 20cm (RIF)

• Appendicular orifice

↳ 2cm posterior & medial to ileal opening
↳ Guarded by valve of Cecum

• Base of appendix :- 2cm below intersection of
right lateral & trans-tubercular plane

• McBurney Point :- Junction of lateral 1/3 &
medial 2/3 of line from ASIS to umbilicus.

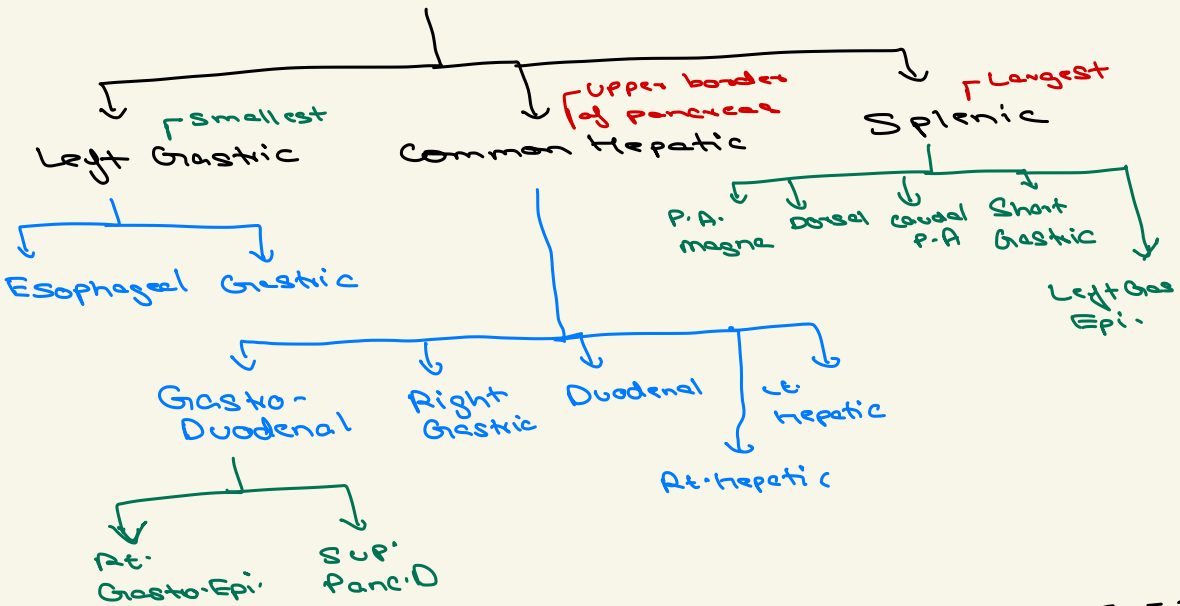
• Tip of appendix

- ↳ 2 - Pre-ileal / Post-ileal
- ↳ 3 - Sigmoid Promontory
- ↳ 4 - Pelvic
- ↳ 6 - mid-inguinal / caecal^{sub}
- ↳ 11 - Para-caecal
- ↳ 12 - Retro-caecal (MC)

Nerve supply (PS - vagus)

- ↳ Sympathetic: - Lesser Splanchnic, T10 - T11
- ↳ Pain fibre → T10 → Dermatome for umbilicus (referred)

Coeliac Trunk (T12-L1)



- Superior Mesenteric Artery
- Jejunal & Ileal
 - Inferior PD Artery
 - middle colic
 - Right colic
 - Ileocolic

- Inferior Mesenteric Artery
- Left colic
 - Sigmoid
 - Superior Rectal

↓
Lower border of L1

↓
L3 vertebra

• Abdominal Aorta

3 unpaired - Coeliac Artery
- Superior mesenteric Artery
- Inferior mesenteric Artery } viscera

3 paired - Middle suprarenal
- Renal
- Gonadal } viscera

5 paired - Inferior Phrenic
- Four Lumbar } parietals

Terminal - Right & Left common iliac

• Portal Vein

Formative - Superior mesenteric Vein
- Splenic Vein

Trunk - Right Gastric
- Left Gastric
- Superior P.D

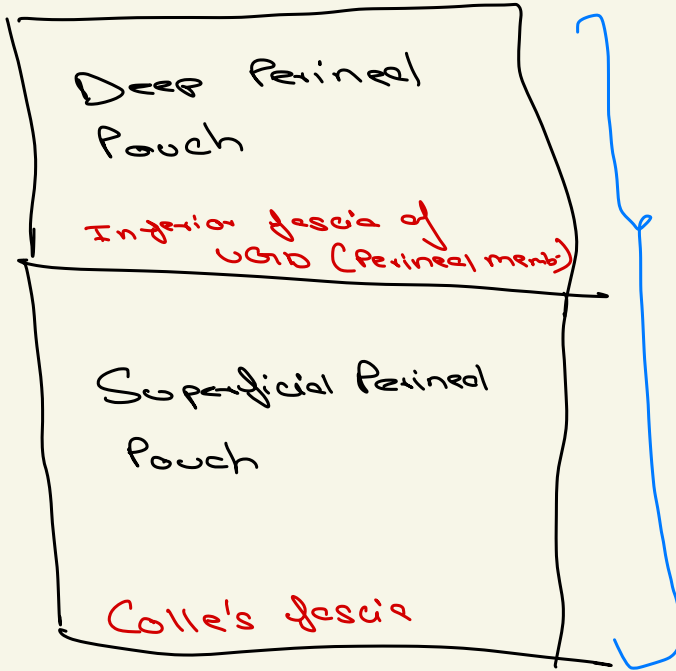
Right - Cystic

Left - Paraumbilical

• Ileocolic

↳ Appendicular
↳ Anterior Caecal
↳ Posterior Caecal

SF fascia of
UGD



Each side



Ischiopubic
Ramus