

② Submandibular gland

Site: between Ant. & Post. bellies of digastric
* mylohyoid divides it → superficial & deep

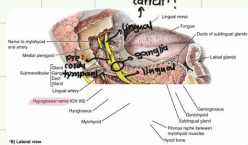
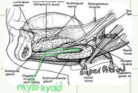
capsule: 1 capsule

secretion: mixed (mucus & serous)

Duct: From Ant. of deep part to → base of tongue
• Floor of mouth
• Submandibular papillae

Innervation:

- sympathetic
- sensory



* 5 structures between mylohyoid & hyoglossus

- ↳ 3 mandibular
- ↳ 2 nerves
- 1) deep part of submandibular gland
- 1) lingual N.
- 2) Submandibular ganglion
- 2) hyoglossal N.
- 3) Submandibular duct

③ Sublingual gland

site: under tongue

capsule: 1 capsule

secretion: mucus

Duct: 8-20 minor ducts → directly to oral cavity under tongue

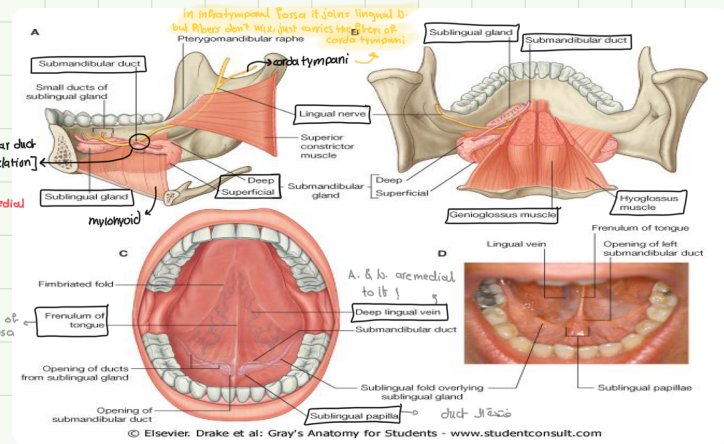
medially: • lingual A.
• Submandibular duct
• genioglossus muscle

Innervation:

- sympathetic
- sensory

Same !!

between Submandibular duct & lingual N. [Triple relation]
1) lateral 2) below 3) medial



□ The Palate

Two types

Soft

- loose C.T
- uvula in middle
- originates from extension of

Hard

- dense mucosa
- adherent to periosteum (4 folds) + rugae (grooves)
- two bones: 1) Palatine process of maxilla 2) horizontal plate of palatine bone

• Palatine aponeurosis: fibrous sheet attached to the posterior

Starts from the Spine



pharyngeal plexus

- in posterior wall of pharynx
- 1) glossopharyngeal N.
- 2) accessory N. (cranial 11th)
- 3) vagus N.

(Palatine tendon) on a spine in hard Palate

- muscular tissue covered by mucosa

• Movement:

- ↳ upwards & backwards (closes nasopharynx in vomiting)
- ↳ downwards & forwards (closes oropharynx in mastication) to increase pressure
- ↳ normally (nasal cavity & oral cavity are open) for articulation + respiration

• 5 muscles:

- 1) Tensor veli palatini
or spine of sphenoid + auditory tube
I: palatine aponeurosis
N: stem of mandibular N.
A: Tenses soft palate
- 2) Levator veli palatini → elevation to close nasopharynx
or petrous part of temporal bone + auditory tube
I: palatine aponeurosis
N: pharyngeal plexus
A: Raises soft palate
- 3) Palatoglossus → in the folds around palatine tonsils
- 4) Palatopharyngeus
N: pharyngeal plexus
- 5) Musculus uvulae
N: pharyngeal plexus
A: elevates soft palate

Blood Supply

Hard palate

through incisive foramen

Nasal cavity

Hard palate

Hard palate

Hard palate

Hard palate

Hard palate

Hard palate

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Hard palate

Disease causes enlargement in uvula → like (Diphtheria)

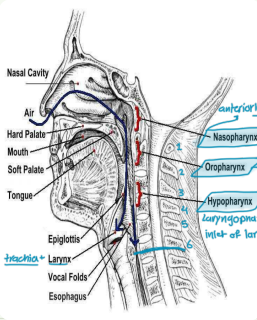


Lecture 2

□ The Pharynx

↳ It extends from (Base of skull) to (lower border of C6) ⇒ continues as esophagus
 ↳ It is a muscular tube → opens anteriorly (u-shaped)
 ↳ wall: musculomembranous wall [deficient anteriorly]
 ↳ lining mucosa: stratified squamous non-keratinized epithelium

then loose areolar C.T
 then muscular layer : between two C.T
 then C.T

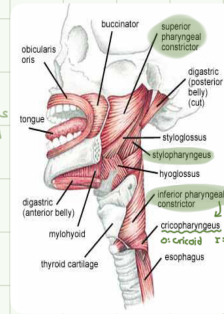


mainly 3 muscles:

- (constrictor muscles of pharynx)
- Superior constrictor
- middle constrictor
- inferior constrictor
- ↳ 1) Circular fibers
- 2) help propel of bolus downward to esophagus
- salpingopharyngeus → internally
- stylopharyngeus
- 3) oblique fibers

common insertion: pharyngeal raphe

From: pharyngeal tubercle (in front of Foramen magnum)
 To: esophagus



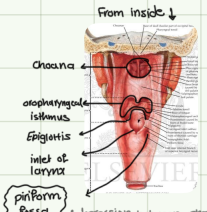
* Killian's dehiscence

↳ small area lies above the upper border of cricopharyngeus muscle
 ⇒ very sensitive → any stimulus causes contraction of vomiting



• circular fibers

importance: works as sphincter
 to prevent air passage into GIT
 ↳ always closed (contracted), it opens only by stimulation of bolus
 ↳ when air accumulates in stomach, it will be in the bolus as black dot in x-ray images
 ↳ horizontal



↳ common site for the lodge of foreign bodies (موضع لاجأ الأجسام الغريبة)

• Muscles :-

1) Superior constrictor muscle

- o: medial pterygoid plate, pterygoid tubercle, pterygo-mandibular ligament, mylohyoid line
- I: pharyngeal raphe
- N: pharyngeal plexus
- A: propels bolus downward

4) Stylopharyngeus muscle

- o: styloid process
- I: pharyngeal raphe
- N: Glossopharyngeal N. [EXCEPTION]

5) Salpingopharyngeus muscle

- o: Auditory tube (lateral wall of nasopharynx)
- N: pharyngeal plexus

* Auditory tube (Eustachian)

↳ Balance of air pressure in tympanic membrane

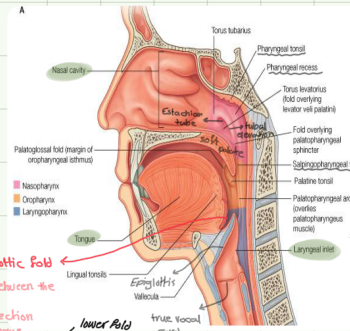
↳ Some vomitus of infants (keep laying) enters the nasal cavity through estachian tube to middle ear
 ⇒ causing otitis media!

2) Middle constrictor muscle

- o: lower part of stylohyoid ligament, lesser & greater cornu of hyoid bone
- I: pharyngeal raphe
- N: pharyngeal plexus
- A: propels bolus downward

3) Inferior constrictor muscle

- o: 1st → lamina of thyroid, 2nd → cricoid cartilage
- I: pharyngeal raphe
- N: pharyngeal plexus
- A: propels bolus downward



• glossopharyngeal fold
 ↳ the space between the vallate papillae of the connection between tongue & epiglottis (Saliva ↓)

• nasopharynx:

start → base of skull
 End → soft palate
 Roof → pharyngeal tonsil → adenoid
 ↳ enlarges & blocks nasopharynx → difficulty in breathing
 lateral → Eustachian tube
 Titled elevation: salpingopharyngeal fold
 Pharyngeal recess/fold

• oropharynx

lateral → palatine tonsil

• laryngopharynx

* Sensory innervation of the pharyngeal mucosa

→ Nasopharynx: Maxillary N.

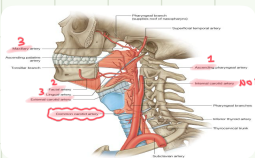
→ Oropharynx: Glossopharyngeal N.

→ Laryngeal pharynx: Internal laryngeal branch of vagus N.

↳ فاصل بين middle & inferior constrictor

* Blood Supply

- 1) Ascending pharyngeal A.
- 2) Tonsillar branches of facial A.
- 3) Branches of maxillary & lingual A.



* Lymphatic drainage

Direct → Deep cervical nodes
 Indirect via retropharyngeal / Paratracheal nodes

□ Palatine tonsils

↳ between (Palatoglossal arch) & (Palatopharyngeal arch)
 ↳ at lateral wall of oropharyngeal isthmus
 ↳ masses of lymphoid tissue

• Function :

In children → Filtration of bacteria, viruses & foreign bodies
 In adults → shrink (less infections)

• Covered by mucus membrane

medial surface: crypts of infection (The mucosa is highly folded + infections) (موضع لاجأ الجراثيم)
 lateral surface: loose C.T + veins + Nerves + Blood supply
 ↳ Two common carotid A.
 ↳ Two tonsillar branches of facial A.

* external / supra palatine vein → superior constrictor muscle joins pharyngeal plexus of veins

↳ After tonsillectomy → you have to keep the patient under observation (24 hr) for fear of [operative bleeding]
 ↳ may cause injury for the ligated vein (by surgeon) ↳ its contraction ↳ superior constrictor muscle side the vein

□ Deglutition

↳ The process of swallowing

- 1) eating 2) mastication
 - soft palate → downward
 - tongue → upward
 - ↳ to cause pressure in oral cavity & close the oropharyngeal isthmus
- 3) bolus is formed 4) go the duodenum
- 5) swallowing
 - soft palate → upward & backward
 - posterior wall of pharynx → forward by constrictor muscles
 - epiglottis → downward & backward by the bolus itself
 - Larynx & pharynx → upward
 - ↳ to close the nasopharynx
 - ↳ to close laryngeal inlet
 - ↳ if happened → coughing

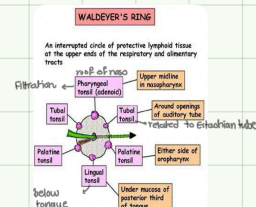
* lymphatic drainage

↳ upper deep cervical lymph nodes

• Behind the angle of mandible

• Waldeyer's Ring of Lymphoid Tissue

مقبرة موزان
 oropharyngeal isthmus

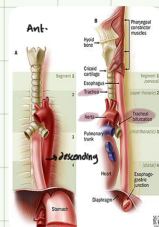


Lecture 3

The Esophagus

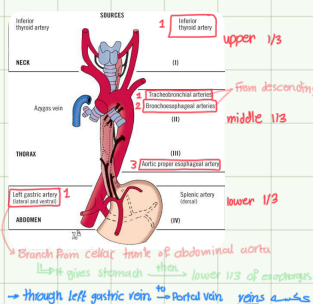
- start: lower border of cricoid cartilage
- end: cardia of stomach
- length: 25 cm = 10 in (from incisors 45 cm $\pm$ 2)
- muscular tube: 1) mucosa (inside) 2) submucosa 3) muscularis 4) adventitia (outside)

Relations



- separates esophagus from left atrium*
- Anteriorly:** 1) Trachea 2) Left recurrent laryngeal N 3) Left main bronchus 4) pericardium (oblique sinus in heart)
- Posteriorly:** 1) Thoracic vertebrae 2) right posterior intercostal A 3) descending thoracic aorta
- Right side:** 1) Right pleura 2) Right lung 3) azygos vein
- Left side:** 1) Left pleura 2) Left lung 3) subaortic A 4) aortic arch 5) thoracic duct

Blood Supply



Lymphatic drainage

- upper 1/3: deep cervical nodes
- middle 1/3: superior & posterior mediastinal nodes → Related to lungs
- lower 1/3: Celiac nodes along the left gastric BVs

Nerve Supply [Esophageal plexus of nerves]

- Sympathetic (From superior cervical sympathetic ganglia)
- Parasympathetic (From vagus N.)

Gastroesophageal sphincter

- physiological sphincter (not anatomical: no thickening of smooth muscle cells that make sphincter)
- IMP: Prevents reflux of material from stomach to esophagus
- * clinical points *

Common sites for lodged foreign bodies in esophagus

- 1) beginning of esophagus (because pharynx are wider & esophagus is thinner)
- 2) during penetration of the diaphragm (there is a muscle)
- 3) left main bronchus (it crosses stomach + it contains cartilage)
- 4) near arch of aorta (it causes a pressure on esophagus)

Relation of Stomach

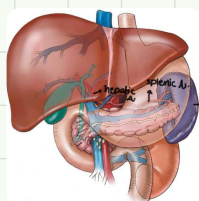
Anterior - superior

- 1) Anterior abdominal wall
- 2) left costal margin
- 3) left pleura & lung
- 4) diaphragm
- 5) left lobe of liver

* Peritoneum makes greater sac (not) lesser sac (also)

Posterior - Stomach bed

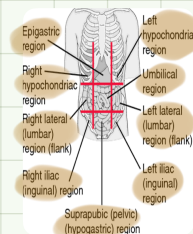
- 1) lesser sac → upper stomach is getting bigger (it has a space posteriorly)
- 2) left crus of diaphragm
- 3) spleen
- 4) left kidney & suprarenal gland
- 5) splenic A → splenic vein behind pancreas so it is not a bed
- 6) Body of pancreas
- 7) transverse mesocolon
- 8) transverse colon



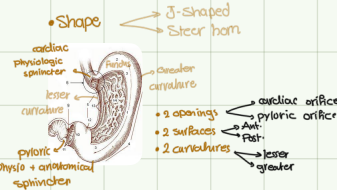
- hepatogastric ligaments** divided into:
- 2 layers of peritoneum between 2 organs (stomach & liver)
 - They contain: 1) Fat 2) BVs 3) Nerves 4) lymph nodes

The Stomach

- in epigastric region of abdomen + extends upward to left hypochondriac region
- dilated part of alimentary canal
- between esophagus & small intestine



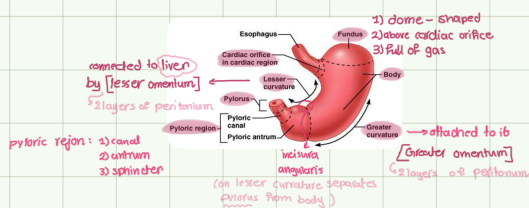
Shape



Function

- 1) stores food (capacity 1500 ml)
- 2) gastric secretions → semi-fluid chyme [digestion] → keep (2-4h) for complete evacuation by pyloric sphincter

Parts



Layers

- covered by peritoneum
- 1) mucosa → bring epithelium [simple columnar without goblet cells] + rugae → lesser curvature → longitudinal, other areas → transverse
 - 2) submucosa → lamina propria [loose G-T filled with gastric glands]
 - 3) muscular layer → muscularis mucosa [small layer of smooth muscle]
 - oblique innermost
 - circular inner
 - longitudinal outer
 - 4) serosa (mesothelium [simple squamous epithelium])
- which one makes the thickening in pyloric sphincter? → inner circular = the oblique is absent!

Orifices of stomach

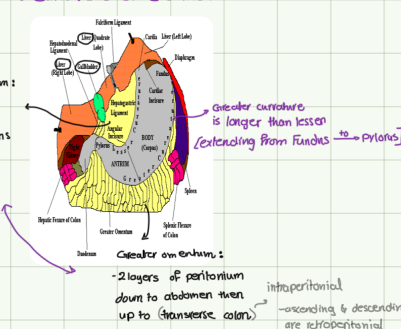
Cardiac

- Physiological sphincter
- Vagus N → contraction to prevent reflux of material
- Surface anatomy: 7" left costal cartilage
 - 1 in to the left of midline
 - 45 cm from incisors
 - 10 cm from abdominal wall

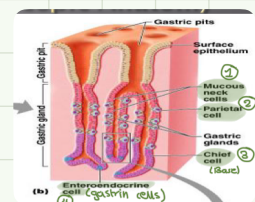
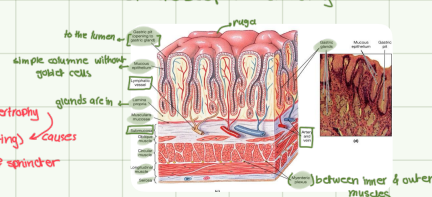
Pyloric

- Physiological & anatomical sphincter
- contraction for (pyloric canal) - thickening of inner circular muscle
- sympathetic → contraction (narrow)
- vagus N → relaxation (wider)
- Surface anatomy: 1 in to the right of midline
- * Embryological anomalies: pyloric sphincter hypertrophy → causes Tx: surgical release of sphincter
- (vein of mayo) crosses the sphincter

Curvatures of Stomach



Microscopic Anatomy



- goblet cells → on surface
- mucus cells → inside

4 types of cells

Blood Supply

1) Gastric A. → Right (From hepatic A.) in lesser omentum
→ Left (to lower 1/3 of esophagus & stomach)

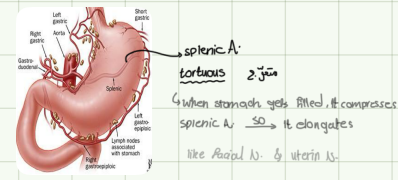
2) Gastroepiploic A. → Right (From hepatic A.) in greater omentum
→ Left (From splenic A.)

- celiac trunk (above pancreas)
→ left gastric A. → short gastric A. → Fundus
→ left gastroepiploic
→ right gastric
→ right gastroepiploic
→ gastroduodenal → right gastroepiploic A.
→ superior pancreaticoduodenal A.
→ liver

Foregut: lower esophagus + stomach + upper half of duodenum → celiac trunk

Midgut: lower half of duodenum + small intestine → lateral 1/3 of transverse → Superior mesenteric Ar. region

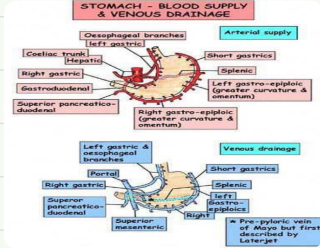
Hindgut: lateral 1/3 of transverse + descending colon + rectum + upper half of anal canal → inferior mesenteric A.



veins & lymphatics

left gastric v. from esophagus then stomach to portal v.

superior mesenteric v. + splenic v. → Portal v.



Lymphatic drainage

drainage from:
1) stomach
2) spleen
3) duodenum
→ celiac lymph nodes
→ cisterna chyli in abdominal aort opening → thoracic duct
+ right & left gastric nodes
+ right & left gastroepiploic nodes

Nerve Supply

Sympathetic

- derived from celiac plexus
↓
superior cervical sympathetic ganglion
↓
to the abdomen
↓
lesser & greater splanchnic N.
↓
Postganglionic (they pass through celiac ganglion without synapse)
↓
Pain sensation

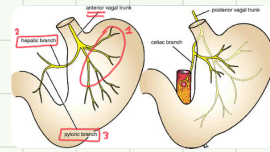
Parasympathetic

- Vagus N. →
- secretomotor → gastric glands
- motor → muscular wall (smooth muscle)
• Pyloric Sphincter
motor → sympathetic
inhibitory → Vagus

1) around esophagus
2) piercing diaphragm

3) left becomes → Ant.
right becomes → Post.

The Anterior Vagal trunk
1) ant. surface of stomach
2) large hepatic branch passes up to liver
3) Ant. lateral N. → pylorus → if cut → no evacuation



The posterior Vagal trunk

1) posterior wall of stomach
2) long branch → small intestine (duodenum +) + 1) large intestine 2/3 of transverse colon → Parasympathetic S234 to hind gut.
3) Post. lateral N. → pylorus

Clinical note

- Gastric ulcer (in stomach)

- Peptic ulcer (mostly in duodenum)

• very rare
• any ulcer in stomach is malignant until proven otherwise.

• any ulcer in duodenum is peptic ulcer until proven otherwise

• the cause of ulcers is Helicobacter pylori
• Gastrosocopy → for diagnosis & treatment
• pyloroplasty (decompression) → part of surgical treatment

* Lecture 4

Small intestine

- length 6 m
- diameter is less than in large intestine
- Function: complete digestion & absorption
- Site: central, in the umbilical region, surrounded by large intestine

① Duodenum

- length: 10 in
- Start: pyloric sphincter → end: duodenojejunal junction
- C-shaped
- concavity:

- ↳ directed to left & backward
- head of pancreas
- opening of common bile duct + pancreatic duct
- (to allow for all pancreatic enzymes & liver secretions & gall bladder open in 2nd part to complete digestion of food)

- 4 Parts

- (1st → 2in) (2nd → 3in)
- (3rd → 4in) (4th → 1in)

retroperitoneal EXCEPT first & last inches

- attached to lesser omentum (above)
- continues to jejunum
- greater omentum (below)

* Cancer in head of pancreas

- swelling → pressure on common bile duct ⇒ obstructive jaundice
- pressure on pancreatic duct ⇒ pancreatitis

- they pass behind
- 1) common bile duct
- 2) portal vein
- 3) hepatic A.

- lesser sac to epiploic opening
- free edge of lesser om.
- head of pancreas duodenum

- superior mesenteric A. & V.
- origin: abdominal aorta behind body of pancreas
- crossing in front of 2nd duodenum

- the tract that transfers bile: biliary tract
- It starts from liver as hepatic duct

- Right Left
- From right lobe
- Left lobe

- cystic duct
- common hepatic duct

- main pancreatic duct
- common bile duct

- major duodenal papilla (2nd part)
- when they open they make (bulge) ⇒ Ampulla of Vater

- common hepatic duct
- cystic duct
- common bile duct

- main pancreatic duct
- common bile duct

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- when they open they make (bulge) ⇒ Ampulla of Vater

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- common hepatic duct
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- main pancreatic duct
- common bile duct

* 1st Part of duodenum

- start: L1 vertebra, on transpyloric line, 1in to right
- directed to liver & gall bladder (upward + backward)

- common site for peptic / duodenal ulcers, when perforation happens & penetrates

* 2nd Part of duodenum

- start: Below right lobe of liver
- end: Between (L3 - L4) disc

- receives secretion from LIVER & PANCREAS & GALL BLADDER

- Cholecystitis / stones in gall bladder / stones in common bile duct causing obstruction ⇒ obstructive jaundice
- chx (open surgery)
- 'dx' (ERCP)

- E: Endoscopy
- R: Retrograde (from oral cavity → major duodenal papilla)

- cutting the sphincter
- common bile duct
- pancreas

- to abdominal cavity
- pancreatitis

- with faces
- remote to the lumen
- adding basket or saline

- cutting the sphincter
- common bile duct
- pancreas

- to abdominal cavity
- pancreatitis

- cutting the sphincter
- common bile duct
- pancreas

- to abdominal cavity
- pancreatitis

- cutting the sphincter
- common bile duct
- pancreas

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- to abdominal cavity
- pancreatitis

- cutting the sphincter
- common bile duct
- pancreas

- to abdominal cavity
- pancreatitis

Ant.

- 1) liver
- 2) gall bladder

Superiorly

- 1) epiploic foramen / foramen of Winslow

Post.

- 1) lesser sac
- 2) bile duct
- 3) portal vein
- 4) I.V.C
- 5) gastroduodenal A. (from hepatic)
- * Bleeding cause

Inferiorly

- 1) The head of pancreas

Post.

- 1) Right kidney & Right ureter

Ant.

- 1) Gall bladder
- 2) Right lobe of liver
- 3) Transverse colon
- 4) coiled of small intestine (Ilium lili)

Lateral

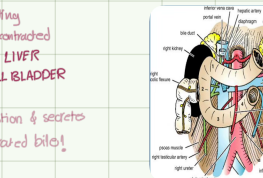
- 1) ascending colon
- 2) Right colic flexure
- 3) Right lobe of liver

Medial

- 1) head of pancreas
- 2) bile & pancreatic ducts

* 3rd Part of duodenum

- At the level of subcostal plane
- crosses LUMBER vertebrae



* 4th Part of duodenum

- upwards to left
- end: duodenojejunal junction (ligament of Treitz) → attached to right crus of diaphragm



• Lymphatic drainage

- upper half ⇒ celiac lymph nodes
- lower half ⇒ superior mesenteric lymph node (around the origin of the artery)

• Nerve Supply

- Sympathetic

- origin: sympathetic chain of chest (T5-T9)
- synapse: Pancreas / the diaphragm

- superior mesenteric ganglia (around superior mesenteric origin)
- celiac ganglia (around celiac trunk)

- with SVs (post gang)

- with SVs (post gang)

- with SVs (post gang)

- Parasympathetic

- with vagus N. (X) (vagus)

synapse

- myenteric ganglia (wall of the organ)
- meissner ganglia

* Para + vagus make plexuses

- ↳ For foregut → celiac plexus → branches of celiac trunk
- ↳ For midgut → superior mesenteric plexus → branches of superior mesenteric A.

- ↳ For foregut → celiac plexus → branches of celiac trunk
- ↳ For midgut → superior mesenteric plexus → branches of superior mesenteric A.

- ↳ For foregut → celiac plexus → branches of celiac trunk
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- ↳ For foregut → celiac plexus → branches of celiac trunk
- ↳ For midgut → superior mesenteric plexus → branches of superior mesenteric A.

- ↳ For foregut → celiac plexus → branches of celiac trunk
- ↳ For midgut → superior mesenteric plexus → branches of superior mesenteric A.

Ant.

- 1) The root of mesentery of small intestine
- 2) superior mesenteric vessels
- 3) coils of jejunum

Post.

- 1) Right ureter
- 2) Right psoas muscle
- 3) I.V.C
- 4) aorta

Superior

- 1) Head of pancreas

Inferior

- 1) coils of jejunum

Ant.

- 1) Beginning of root of mesentery
- 2) coils of jejunum

Post.

- 1) Left psoas major
- 2) sympathetic chain
- 3) left margin of aorta

Superior

- 1) uncinate process of pancreas

- ↳ excess of head of pancreas to left side

- Blood Supply divided by major papillae into:

upper half

- Foregut

- superior pancreaticoduodenal A.

- gastroduodenal A.

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

lower half

- midgut

- inferior pancreaticoduodenal A.

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

- Branch from

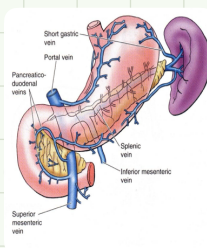
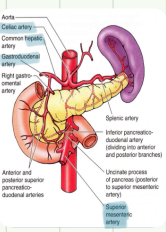
- Branch from

- Branch from

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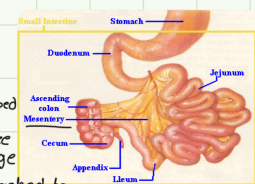


veins

veins

jejunum & ileum

- intra peritoneal organs (in the mesentery)
- length : 6 m
- mobile
- upper 2/5 $\Rightarrow$ jejunum - lower 3/5 $\Rightarrow$ ileum
- Start : Ligament of Treitz - end : Cecum (Ileocecal junction) in right iliac fossa
- in umbilical region (surrounded by large intest.)



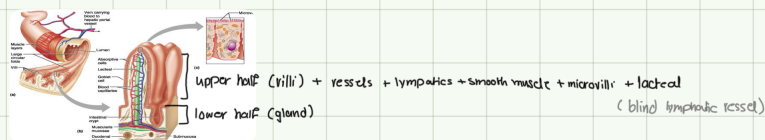
- fan shaped
- free edge attached to jejunum & ileum

- (physiological sphincter only)
- No thickening of smooth muscle
- Fold of mucosa that prevent material to return back from Cecum to ileum by the pressure of material on Cecum

- contains :
 - Superior mesenteric vessels
 - lymph nodes
 - plexus of N. $\rightarrow$ Para Sympathetic
 - Fat

Histology

- small intestine $\Rightarrow$ villi (finger like projection) $\rightarrow$ on apex $\rightarrow$ micro villi
 - $\rightarrow$ to increase surface area for absorption
 - $\rightarrow$ to increase surface area
- lining epithelium $\Rightarrow$ simple columnar with goblet cell

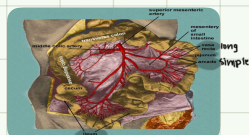


Difference between Jejunum & Ileum		
	jejunum	Ileum
length	Proximal 2/5	Distal 3/5
site	in the upper part of the peritoneal cavity below the left side of the transverse mesocolon	in the lower part of the cavity and in the pelvis
wall	thicker wall & nodular	thinner & less nodular
Arches in mesentery	simple only one or two arches with long infrequent branches	more complex short terminal vessels arise from a series of three or four or even more arches
connection between branches of superior mesenteric A. (windows)	artery returns to the organ $\rightarrow$ direct blood supply	
Fat in mesentery	more distally	
	- the fat is deposited near the root - it is scanty near the intestinal wall - no window appear	- the fat is deposited throughout mesentery - no window - No window appear

Difference between Jejunum & Ileum		
	jejunum	Ileum
Diameter	larger	smaller
villi	numerous	Less numerous
Plicae circulares (the permanent enfolding of the mucous membrane) submucosa like rugae in stomach	1- They are 2- more numerous 3- closely set	1- They are 2- more widely separated 3- in the lower part they are absent
Lymphatic follicles	NO or few	Aggregations of lymphoid tissue (Peyer's patches) are present in the mucous membrane

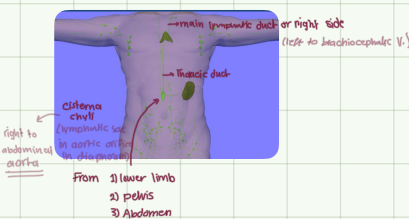
Blood Supply

- Branches from Superior mesenteric A.
- tributaries of Superior mesenteric V.



Lymphatic drainage

- $\Rightarrow$ Superior mesenteric lymph node (common origin of A.)

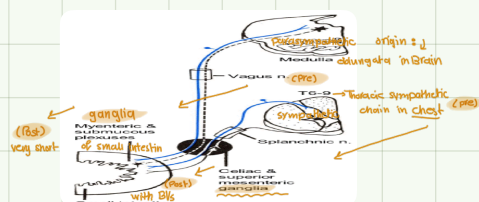


Nerve Supply

- Sympathetic
- Vaso constrictor

- Parasympathetic
- secrete motor (peristaltic movement)
- innervates smooth muscles

$\Rightarrow$ They reach the organs by SAs (plexus of nerves around SAs)



Meckel's Diverticulum

- Remains of vitelline duct of embryo (opening)
- between midgut (ileum) & Umbilicus
- It has to be completely closed after delivery (obliteration)
- congenital anomaly in ileum
- 2%
- 2 feet from ileocecal junction
- length : 2 in
- contains gastric & pancreatic tissue

complications

- 1) Infection $\Rightarrow$ usually thought to be appendicitis
- 2) Ulceration
- 3) Perforation
- 4) Peritonitis $\Rightarrow$ (bursting)

